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MAY 12 1928

TWENTY-FIFTH YEAR

The Heating and Ventilating Magazine

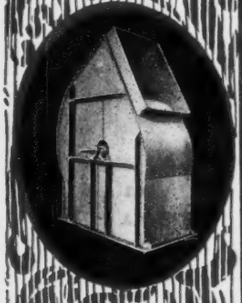
A Monthly Journal of Engineering Progress

Vol. XXV. No. 5.
$2.00 a year. 30 cents a copy.

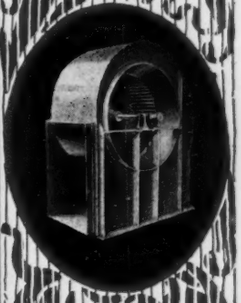
MAY, 1928

Heating & Ventilating Magazine Co.
386 Fourth Avenue, New York.

TYPE ME FAN



SINCE THE FAN in a system represents less than 5% of the cost, but is accountable 100% for the successful operation of the System, surely it is good business to use *the* fan that has been *tested* and *certified* in the laboratories of two prominent universities—and its ratings established beyond question. ¶Think of this in terms of client satisfaction.



NEW YORK BLOWER COMPANY
2242 SOUTH HALSTED ST.
CHICAGO, ILLINOIS

One Plant Saved $50,000

.... No Boiler Equipment Required

THERE was a new plant to be heated and bids were taken. Steam or hot water would have cost not less than $200,000....Clarage McCann Harrison Heaters are now being installed for $150,000 complete....$50,000 saved.

Here is a practical system for heating any type or size of factory at a price that hits rock bottom....no boiler plant or boilers required, no stack, no supply and return lines, no pumps, and no radiators.

Clarage McCann Harrison Heaters are direct fired, burning either oil or gas and discharging warm, clean air under positive fan pressure....operation entirely automatic...approved by fire underwriters. They are installed within the building to be heated.

And aside from the saving in first cost, this system effects operating economies of paramount importance....cutting out labor expense....wages of at least one engineer and one fireman eliminated.

If you are planning a new factory, don't spend thousands on a boiler plant until you consult with Clarage engineers. Or if you have an existing plant, an addition or one floor to heat, by all means get in touch with us.

Use Coupon for complete information.

CLARAGE FAN COMPANY
Kalamazoo, Michigan

Please send complete information on Clarage McCann Harrison Heaters.

Name.....

Address.....

City.....State.....

H&V-5-28

CLARAGE

McCANN HARRISON HEATERS

KEWANEE STEEL BOILERS

Lower Heating Costs

Kewanee Boilers are built with plenty of space, above the water line, for the steam. This space has to be *high* so that the steam in the supply pipes will be dry. Also the space must be wide so that there will be *enough steam in reserve* to cushion all fluctuations of the heating load.

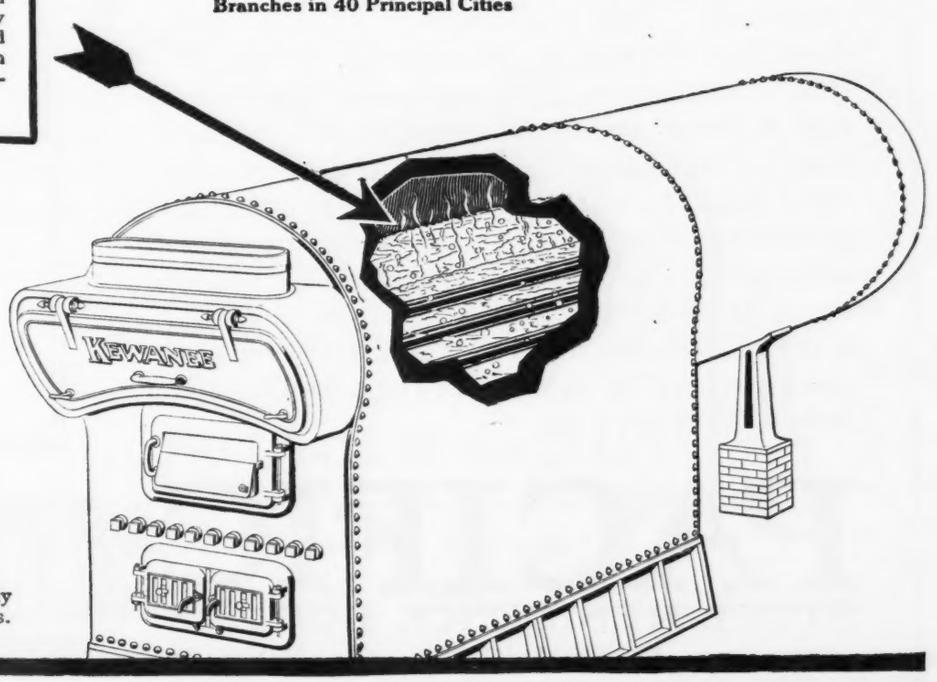
This is one of the many Kewanee features which definitely assure the greatest amount of heat for the building with the least fuel, and *guarantee lower heating costs.*

KEWANEE BOILER CORPORATION

Kewanee, Illinois

Branches in 40 Principal Cities

Right Here: there's high and wide space full of dry steam all ready to respond instantly to every sudden demand without commotion inside the boiler.

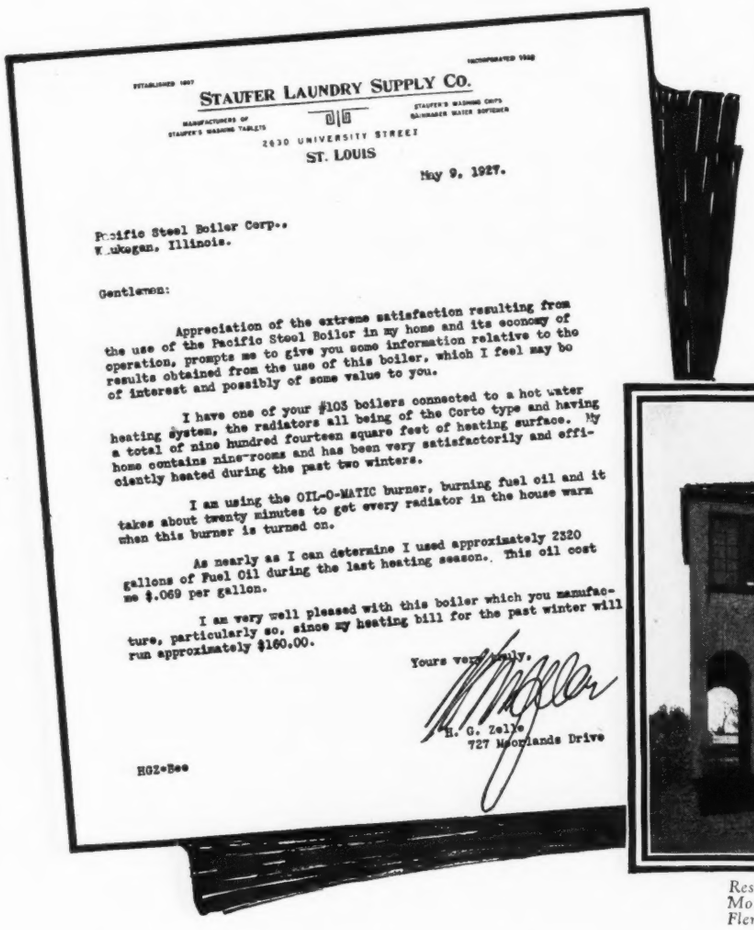


One of a Series—explaining just why Kewanee Boilers Cut Fuel Costs.

THE HEATING AND VENTILATING MAGAZINE, published by THE HEATING AND VENTILATING MAGAZINE CO., at 386 Fourth Avenue, New York, N. Y. Subscription rates: United States, $2.00; Canada, $2.50; Foreign, $3.00. Single copies, 30 cents. Vol. XXV, No. 5, May, 1928. Entered as second-class matter, April, 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

Only $160.00 a Season—

to Heat This Home *With Oil*



STAUFER LAUNDRY SUPPLY CO.

MANUFACTURERS OF STAUFER'S WASHING TABLETS

STAUFER'S WASHING CHIPS
GUARANTEED WATER SOFTENER

2630 UNIVERSITY STREET
ST. LOUIS

May 9, 1927.

Pacific Steel Boiler Corp.,
Waukegan, Illinois.

Gentlemen:

Appreciation of the extreme satisfaction resulting from the use of the Pacific Steel Boiler in my home and its economy of operation, prompts me to give you some information relative to the results obtained from the use of this boiler, which I feel may be of interest and possibly of some value to you.

I have one of your #103 boilers connected to a hot water heating system, the radiators all being of the Corto type and having a total of nine hundred fourteen square feet of heating surface. My home contains nine rooms and has been very satisfactorily and efficiently heated during the past two winters.

I am using the OIL-O-MATIC burner, burning fuel oil and it takes about twenty minutes to get every radiator in the house warm when this burner is turned on.

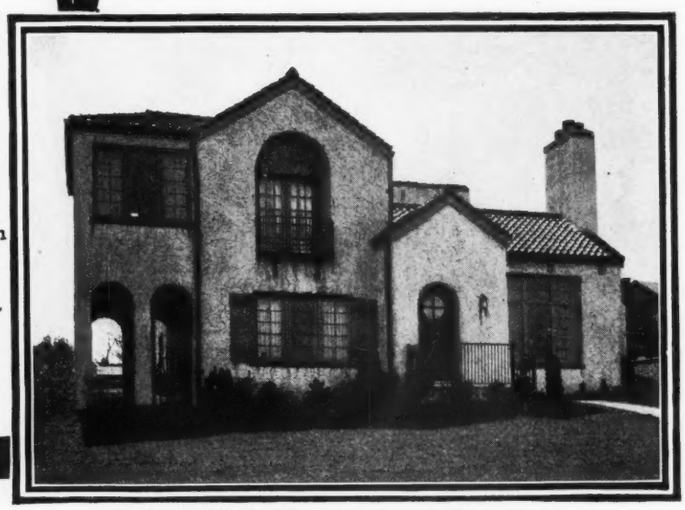
As nearly as I can determine I used approximately 2320 gallons of Fuel Oil during the last heating season. This oil cost me $.069 per gallon.

I am very well pleased with this boiler which you manufacture, particularly so, since my heating bill for the past winter will run approximately $160.00.

Yours very truly,

H. G. Zelle
727 Moorlands Drive

HGZ-Bee



Residence of H. G. Zelle, 727 Moorlands Drive, Clayton, Mo. Architect, Jesse L. Bowling. Heating Contractor, J. P. Fleming. One No. 103 Pacific Steel Residence Boiler installed.

The exceptional adaptability of Pacific Steel Boilers to oil burning has long been recognized in the heating of schools, office buildings, hotels, and other large structures. Now Pacific Steel Residence Boilers, employing the same principle of four-time fire travel, are setting records which rival the performance of the larger units.

Here is an example — a moderate-sized residence heated with a standard Pacific Hot Water Residence Boiler and a popular make of oil burner. The owner obtains quick heat —real heating comfort—all the advantages of oil fuel, at a cost of only $160.00 a season! Read his letter carefully; it is a typical expression from Pacific owners—the sort of response you can count on, if you use Pacific Steel Residence Boilers. Write for catalog.

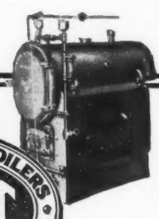
Compare This Heating Cost With the Cost of Operating Other Boilers

Heating load: 571 sq. ft. equivalent C. I. steam radiation.

Fuel used (1926-27 heating season): 2320 gallons oil at $.069 per gallon.

Cost of heating per square foot radiation: 28 cents per year.

Cost of heating per degree temperature difference: .0097 cents per year per square foot radiation.

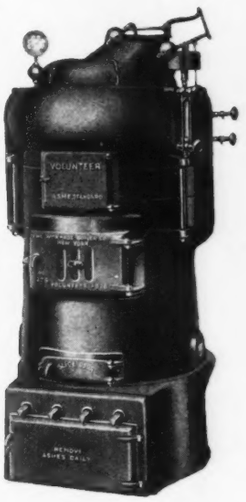


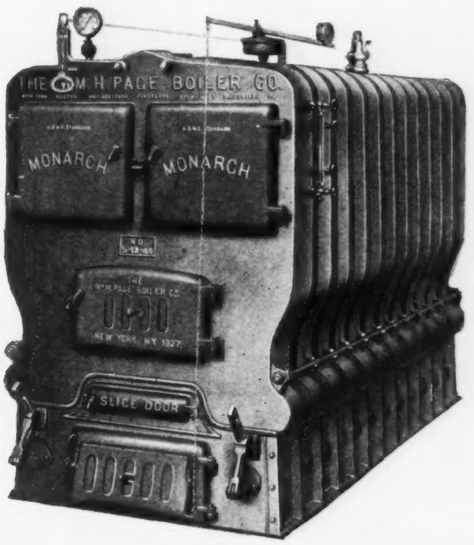
PACIFIC

STEEL RESIDENCE BOILERS

Factories ~ ~ WAUKEGAN, ILLINOIS ~ ~ BRISTOL, PA.

STEEL HEATING BOILERS
PACIFIC
WAUKEGAN, ILL. BRISTOL, PA.
TRADE MARK REG. U.S. PAT. OFF.





Page Boilers Come In Every Size You Will Need

WITHIN the covers of the Page Catalogue No. 54 you will find data on heating boilers of every capacity—for the cottage, requiring a small Volunteer round boiler — or the large building calling for a big 60″ Monarch.

Investigate the Page line. You will find it surprisingly extensive, and most moderately priced. Here are boilers representing full value for the first cost, and assuring economy in operating costs for the life of the building in which they are installed.

If the latest Page Catalogue is not in your files, we shall be glad to send it to you, and to have our representative confer with you, if such is your desire. Write us, or telephone our nearest office.

THE WM. H. PAGE BOILER COMPANY

Makers of a Complete Line of Round and Square Steam and Hot Water Boilers

General Offices: 200 Madison Ave., New York

Branch Offices and Warehouses: BOSTON, 123 Beverly St.; CLEVELAND, Rose Bldg.; PHILADELPHIA, 1126 Washington Ave. BROOKLYN, 98-49th St. WASHINGTON, 1117 15th St., N. W. Factory: MEADVILLE, PENNSYLVANIA.

★ ★ ★ A DOLLAR SAVED by a home owner

IS A DOLLAR EARNED by the heating contractor

Every Spencer Heater installed begins to save the owner money with the first shovelful of coal it burns. The Spencer is a Magazine Feed Heater that burns No. 1 Buckwheat anthracite at half the cost of domestic sizes, and that cuts the owner's bill for heat in half.

Every Spencer Heater installed earns the heating contractor a double profit. It costs a little more than ordinary heaters—and you know that the larger the sale, the larger the profit. When you install a Spencer, you get your profit, for you don't have to shave prices in competitive bidding.

Make the saving power of Spencer Heaters earn money for you.

Spencer
steam, vapor or hot water
Heaters
burn No. 1 Buckwheat Coal

SPENCER HEATER COMPANY *General Offices:* WILLIAMSPORT, PA.

New York City Boston Philadelphia Baltimore Buffalo Rochester Hartford Albany Syracuse Scranton

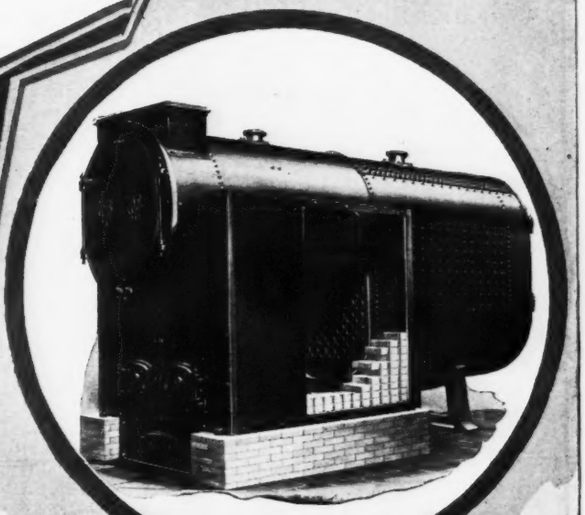
Division of Lycoming Manufacturing Company

STEAM CAPACITIES:—Cast Iron Sectional *from 600 feet to 3,200 feet.* Steel Tubular *from 2,000 feet to 16,000 feet*

Two Titusville Perfection Boilers in the Blackstone Hotel, Omaha, Neb.

¶ Nothing is more vital to the success of a modern first class hotel than a good dependable boiler plant —Thats why Titusville Perfection Boilers were specified for the Blackstone Hotel shown below.

¶ For Titusville Boilers bear a national reputation for their unexcelled fuel economy and heating efficiency. Our descriptive bulletins will give you all the facts.



THE TITUSVILLE
IRON WORKS COMPANY
TITUSVILLE, PENNA.

Sales Offices:

New York—152 W. 42nd Street
St. Louis, Mo.—401-2 Bank of Commerce Building
Washington, D. C.—626 Woodward Building
Cleveland, O.—118 St. Claire, East Cleveland, O.
Detroit, Mich.—204 Owen Building
Buffalo, N. Y.—Marine Trust Building
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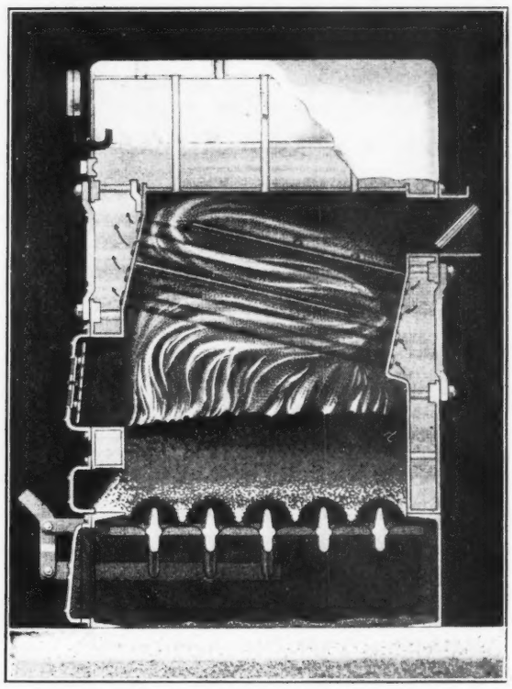
Pittsburgh, Pa.—Farmers Bank Building
Charlotte, N. C.—705 Realty Building
Los Angeles, Calif.—940 Maple Avenue

Specify "KNOWLTON"—
THE COMBINATION BOILER

KNOWLTON WATERTOOB STEEL BOILERS

Coal—Oil—Gas



83% Efficiency

using gas or oil as a fuel in a KNOWLTON "WATERTOOB" BOILER rated at 1300 Sq. Ft. Steam

The above results were obtained in recent tests made outside of our own laboratories.

This efficiency is remarkable considering the size of the boiler, and it can be duplicated with other KNOWLTON Watertoobs under actual operating conditions.

The KNOWLTON will operate most economically and equally well with gas, oil or coal fuels, but to get the most out of any fuel —specify the KNOWLTON.

Write for booklet "Complete Heating Satisfaction" which tells the rest of the KNOWLTON Story.

ORR & SEMBOWER, Inc., Reading, Pennsylvania

(Established 1885)

208 N. Clinton St., CHICAGO 50 Church St., NEW YORK

Profit begins in the Boiler Room

Make more steam per pound of coal and you make more money.

Avoid the waste of profits that pour out of smokestacks in unconsumed carbon or in hot gases.

You can do it by installing a Stanwood Boiler which in construction and design is as nearly perfect as a boiler can be.

Rapid water circulation utilizes every heat unit from the fuel practically possible. The down draft double grate system burns hard or bituminous coal down to a minimum of ash.

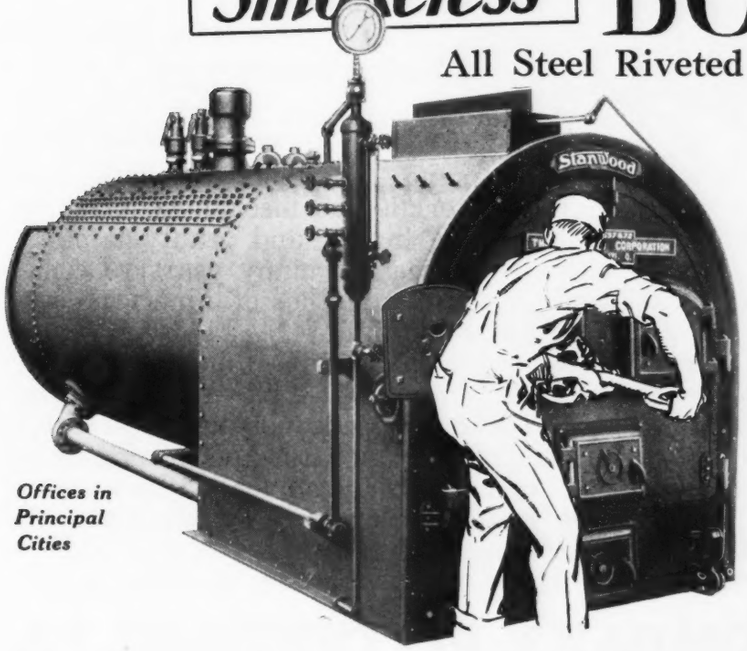
Absence of mudlegs, crown sheet and circumferential seams exposed to fire, minimize repairs and cleaning to a negligible factor. Firing is easy, steaming amazingly quick, without strain on the boiler.

Nor is that all. Profits begin in installation, in less digging, on account of the low water level, in less brick work and minimum heat radiation.

To fully understand how and why the Stanwood saves money in many ways send today for the latest Stanwood Bulletin.

STANWOOD *Smokeless* BOILERS

All Steel Riveted Construction



Offices in Principal Cities

For Coal Oil and Gas

29 to 250 H. P. (3,500 to 31,000 sq. ft. Steam radiation) 15, 100, 125, 150 lbs. working pressures, or higher if desired.

THE STANWOOD CORPORATION

Manufacturers of Smokeless Boilers, Horizontal Return Tubular Boilers, Stacks, Breechings, Tanks, Feed Water Heaters, and Throttling and Automatic Steam Engines.

CINCINNATI, OHIO **Established 1891**

Easy Reply COUPON

THE STANWOOD CORPORATION
Dept. D-58, Cincinnati, Ohio

Please send without obligation pamphlets describing in detail the Stanwood Boiler.....HP.....Pressure

Name .....

Business .....

Address .....

AT THE CROSSROADS *of* THE WORLD!

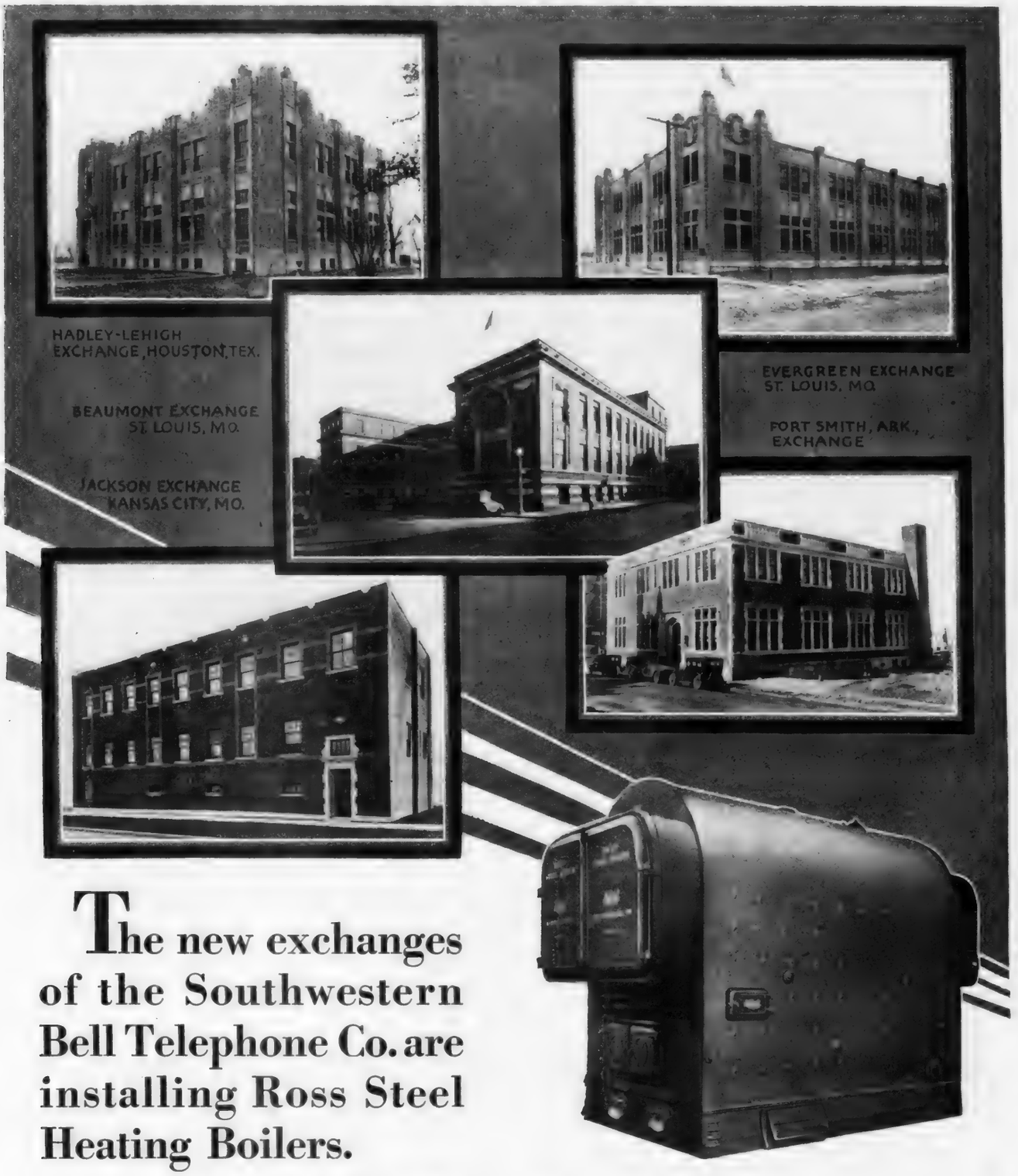
NATIONAL

PARAMOUNT BUILDING
NEW YORK CITY
Architects: C.W.& G.L. Rapp, *Chicago, Ill.*
Plumbing Contractor:
George E. Gibson Co., *New York City*
Heating and General Contractors:
Thompson-Starrett Company, *New York City*

THOUSANDS and thousands of people daily pass this corner—one of the world's busiest thoroughfares. Many, no doubt, stop and peer up in wonder at this magnificent structure, the achievement of a great producer's lifetime ambition—the realization of a boyhood dream. Towering far into the air, truly it represents a monument to the motion picture industry—a magnificent photoplay house and office building—constructed of the finest materials of the present day and age. Here, famous architects and expert engineers put into its plan and erection all the experience and genius at their command. Here, a combination of quality materials and mechanical make-up will back the luxury and beauty it offers with its service for many years to come. Again, as in many other of America's outstanding buildings, "NATIONAL" was used for the major pipe tonnage, another proof of "NATIONAL" Dependability. "NATIONAL" Pipe is resistant to corrosion because, in addition to the Spellerizing Process (sizes 4-inch and under), all butt-weld sizes ½ to 3-inch are made by a special Scale Free Process which eliminates mill-scale—one of the principal causes of corrosion.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
District Sales Offices in The Larger Cities

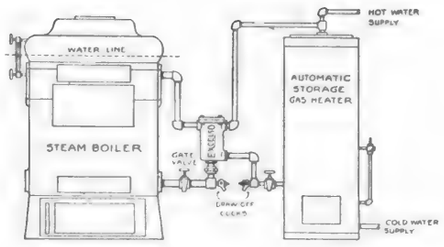
ROSS STEEL BOILERS



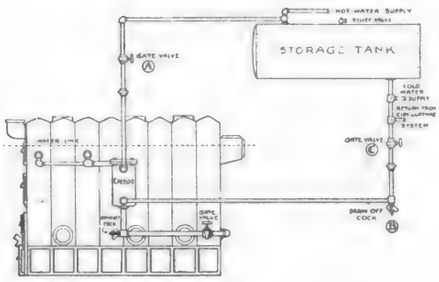
The new exchanges of the Southwestern Bell Telephone Co. are installing Ross Steel Heating Boilers.

The Frost Manufacturing Co.
SINCE 1851

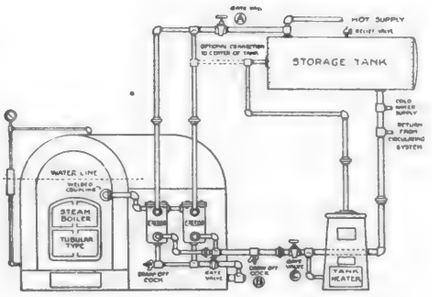
GALESBURG .. ILLINOIS
Branches in Most Leading Cities



Sizes for One Family



or One Hundred Families



EXCELSO produces a Hot Water Heating Unit for all types of heating boilers and furnaces.

Owners Will Thank You for Suggesting EXCELSO *Indirect Heaters*

First—they furnish a more abundant and uniform supply of pure, clean hot water because they have the copper coil and patented ground joint brass connections.

Second—they save the care and cost of separate fire for warming the domestic supply.

Every heating job—new or overhaul—is an Excelso selling opportunity, profitable both for the owner and for you.

Open View of Triple Copper Coil Excelso Heater

Write for catalog giving installation information, telling the story of Hot Water at lowest possible cost.

Excelso Products Corporation
DIVISION OF AMERICAN RADIATOR COMPANY
59 Clyde Ave. *Buffalo, N. Y.*

NATIONALLY DISTRIBUTED BY LEADING WHOLESALERS AND BOILER AND RADIATOR MANUFACTURERS

EXCELSO WATER HEATERS
Sold by All Plumbers and Steamfitters

SIZES FOR ONE FAMILY OR ONE HUNDRED FAMILIES

Burnham Boilers

Bears Or Boilers
You Size Them Up Two Ways

First what they consume, and then what will they do in a fight? All three bears in the story ate the same porridge, but big bear had the biggest dish. Big bear, little bear, middle sized bear; which would you rather meet when you were out for rabbit?

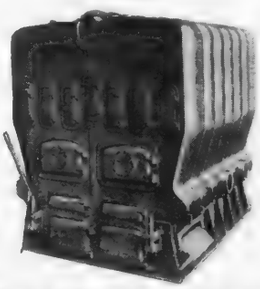
All Burnham Boilers have the same digestion. The extra length of fire travel is a Burnham family trait. But Square Sectional will do more heat-getting than Round Sectional, and Big Twin goes a long way beyond Square Sectional in heating capacity. It's just a matter of size.

These three boiler types go up like the steps of a stair. The capacity mounts to take care of your heating jobs, no matter how big they may be getting to be.

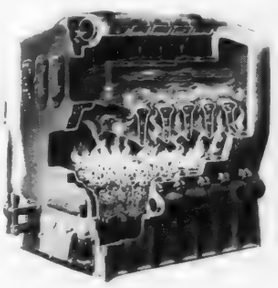
There's a Burnham for every heating purpose. If you don't have your copy send for Catalog No. 67.

This round sectional is a burly little bear, ready to fight tooth and claw for all the heat from the fuel it burns.

Big Twin is the whopping big bear, and it's mighty few jobs you'll have that need a bigger one than this. Big as he is, his heating capacity is bigger.



Burnham Square Sectional is a pretty big middle size bear; really a big one compared to lots of others.



Burnham Boiler Corporation

IRVINGTON, N. Y.

Representatives in all Principal Cities of the United States and Canada.

This Group of Heating Contractors Blazed the Trail...

They've done away with gobs of grief in heating installation jobs

IN EVERY line of business there are leaders—men who seek and recognize new methods and improved equipment. When they find worthwhile new ideas they are quick to put them on the job.

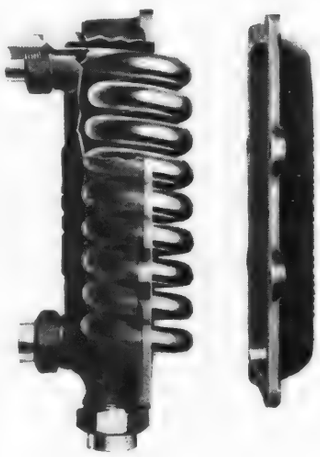
There are many such men among America's heating contractors. Not long ago some of these forward-looking men looked about for something to provide *unfailing* hot water supply at lower cost. They investigated everything available. Many of them hopped on the compact, inexpensive *fuel-less* Taco. Today they seldom put in steam heating equipment without hooking up a Taco Water Heater.

Thus they assure their customers an automatic never-failing supply of clean hot water, *heated by the same fire that heats the building or home.*

But that is not all. They've found that when a Taco is part of the job they are done with water-heating grief. Tough piping problems are simplified, for Taco Water Heaters fit into all kinds of difficult installations.

And *that* is not all. Many of these contractors have found a dollar-breeding side business with Tacos. When customers call them in to replace burned-out firebox coils, or to clean out gas coils, they tell about Taco. Hundreds of little, unprofitable jobs are turned into profitable Taco installations.

If you are not already putting in Tacos you will be interested in the Taco story. Especially, the facts about the Super Taco, the water heater with three connections to the boiler. Let us send you all the dope and engineering data—show you how to add the finishing touch to well installed heating jobs. A post card brings you the whole interesting story.



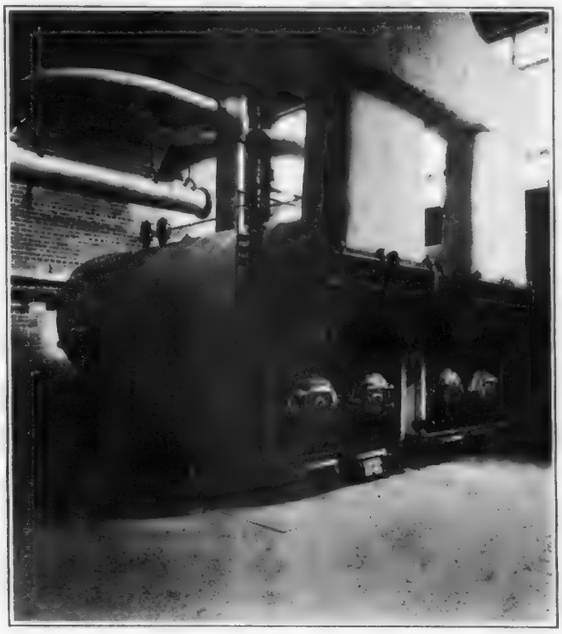
TACO HEATERS, INC., 342 Madison Ave., New York City

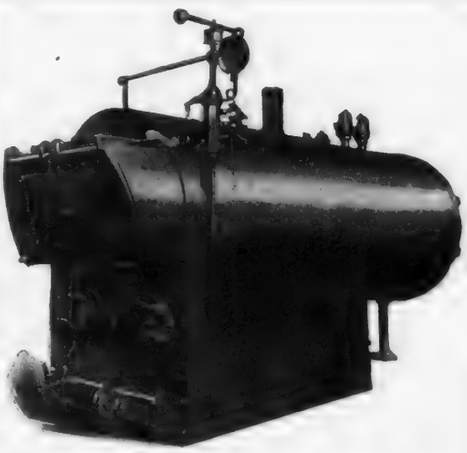
Successor to Thermal Appliance Co.

Makers of

TACO

Automatic FUEL-LESS Water Heaters





ABOVE: A Coatesville All-Steel Portable Fire Box Heating Boiler. These Boilers being self-contained, require a "minimum amount of labor" for installation. Door Hinge Pins are "adjustable" insuring tightness,—and a special method of bracing crown sheets does away with long staybolts.

"Keeping Future Druggists Warm"

Above are shown the Two Series "A"-250 **Coatesville All-Steel Heating Boilers** recently installed in the new building of the Philadelphia College of Pharmacy (Architect, Norman Hulme; Engineers, Calvert and Barnes; Contractor, Wark and Co.; Heating Contractor, Nicholas Connolly; Oil Burners, National Airoil Burner Co.). This is but one of many prominent installations recently made by Coatesville. Names of others upon request.

Reliability is a primary asset of **Coatesville All-Steel Heating Boilers,**—they have been "time tried" on Land and Sea and have "never been found wanting." These Boilers are the natural result of over 40 years' experience, and are available in Welded Construction for 15 lbs. working pressure,—and in Riveted Construction for 100 lbs. pressure. They are available for burning Anthracite Coal, Bituminous Coal, or Oil Fuel.

Every **Coatesville Heating Boiler** is made in accordance with the latest A.S.M.E. Code and its construction is supervised by a **Qualified Insurance Inspector,** whose Certificate of Test is furnished with each Boiler.

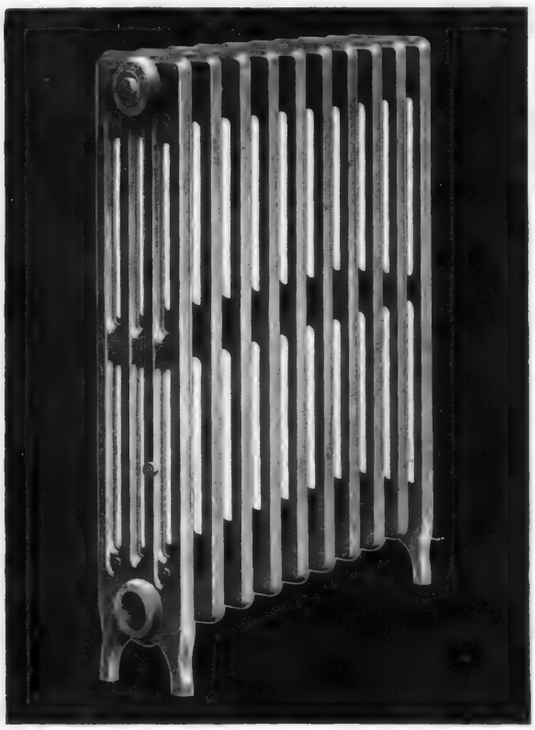
Send for Latest Literature

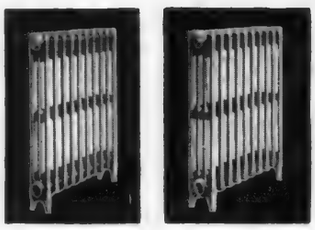
COATESVILLE BOILER WORKS

Boilers - Tanks - Steel Plate Work

Main Office and Works—COATESVILLE, PA.

Philadelphia	New York	Newark	Boston	Pittsburgh	Baltimore
111 S. 15th St.	30 Church St.	60 Park Place	141 Milk St.	Union Trust Bldg.	Lexington Bldg.

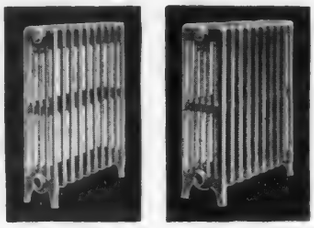




Three Tube Aero Radiator. Graceful, and pleasing, this slender model is particularly adapted to narrow corridors, and rooms where space is at a premium.

Four Tube Aero Radiator. The slender tubes make it charming and efficient; provide the scientifically correct ratio of air space to heating area.

THE RADIATOR THAT SET NEW STANDARDS



Five Tube Aero Radiator. This model finds its field in all general applications: Homes. schools, apartments, offices and everywhere.

Seven Tube Aero Radiator. A unit with tremendous warming capacity, used where space limitations will not permit a long radiator.

Aero, the National Radiator, was the first to successfully combine beauty and efficiency and revolutionized the cast iron radiator industry. Aero created a new appreciation of what radiators should be. Aero pioneered in standardization, introducing—in four models—a type and style for every application.

For more than six years, Aero, the National Radiator, has led the field consistently. Imitated and followed, today it is the only tube type radiator whose value and dependability have been proven over a period of years in all types of buildings all over the nation. Aero, a National Product, is the National Radiator.

NATIONAL RADIATOR CORPORATION

Ten Plants devoted to National Service through these Branch Offices and Warehouses:

Baltimore, Md., 2622 Frisby Street
Boston, Mass., 93-97 Oliver Street
Buffalo, N. Y., McKinley Bldg., Delaware Ave.
Chicago, Ill., 2445 N. Keeler Avenue
Cincinnati, O., Spring Grove & Elmira Ave.
Cleveland, O., 935 E. 63rd Street
Indianapolis, Ind., 431 W. Georgia Street
Johnstown, Pa., 221 Central Ave.
Louisville, Ky., 1126 W. Breckenridge St.
Milwaukee, Wis., 124-130 Jefferson St.
New York, N. Y., 55 W. 42nd St.
Omaha, Neb., 108-112 S. Tenth St.
Philadelphia, Pa., 121 N. Broad St.
Pittsburgh, Pa., 1509 Arrott Building
Richmond, Va., 3032 Norfolk St.
St. Louis, Mo., 1042 Central Industrial St.
Washington, D. C., 2205 Fifth St., N. E.

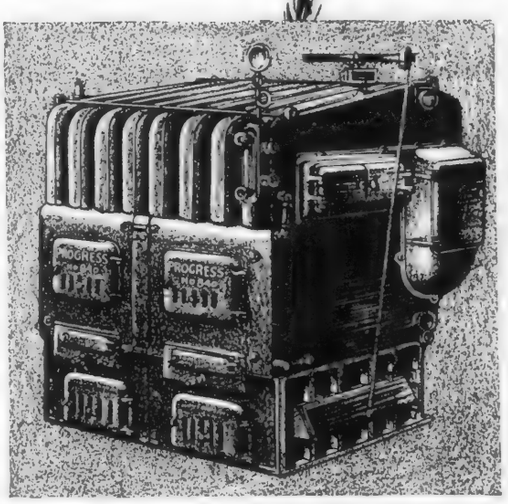
AERO THE NATIONAL RADIATOR

Triple *STAGGERED FIRE TRAVEL*

for greater heat utilization

Thatcher Progress Boilers provide heating flexibility which is greatly desired in industrial and office buildings. By merely installing additional units tremendous increased capacity may be obtained without need for tearing out the original heating installation.

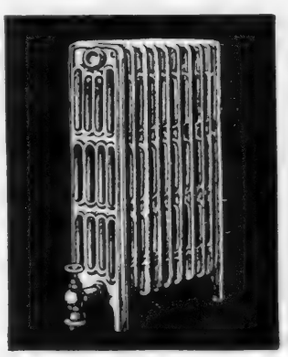
Economy is an integral factor in the operation of Thatcher Progress Boilers because of the Triple "Staggered Fire Travel" feature which means that flames and hot gases are shunted back and forth three times over all heating surfaces before being released up the chimney. Thatcher Progress Boiler facts are detailed in information booklets. May we send them?



"GOTHIC" RADIATORS

Here's the new "Gothic" Radiator! Every line of the new Thatcher "Gothic" radiator expresses charm. Designed to harmonize with modern surroundings. New type tube construction provides greater heating efficiency. Write for details.

THE THATCHER COMPANY
39-41 St. Francis St., Newark, N. J.
New York: 21 West 44th St.
Chicago: 341 No. Clark St.



THATCHER
Progress Boilers
BOILERS - FURNACES - RANGES - RADIATORS

The Three Steps to Perfect Radiation

ROBRAS 20-20 RADIATORS

In the Walls—Under the Window
Out Of The Way

It is really very simple to install a radiator where it will be out of the way. A recess, as shown to the left in the above illustration, is left by mason and carpenter when they finish their part of the work.

You line the recess with galvanized iron. Then you connect up the Robras 20-20 radiator. The sections of this radiator have been assembled at the factory in the lengths and amount of radiation you require. It is ready for you to attach to the existing heat whether it be hot water, steam or vapor.

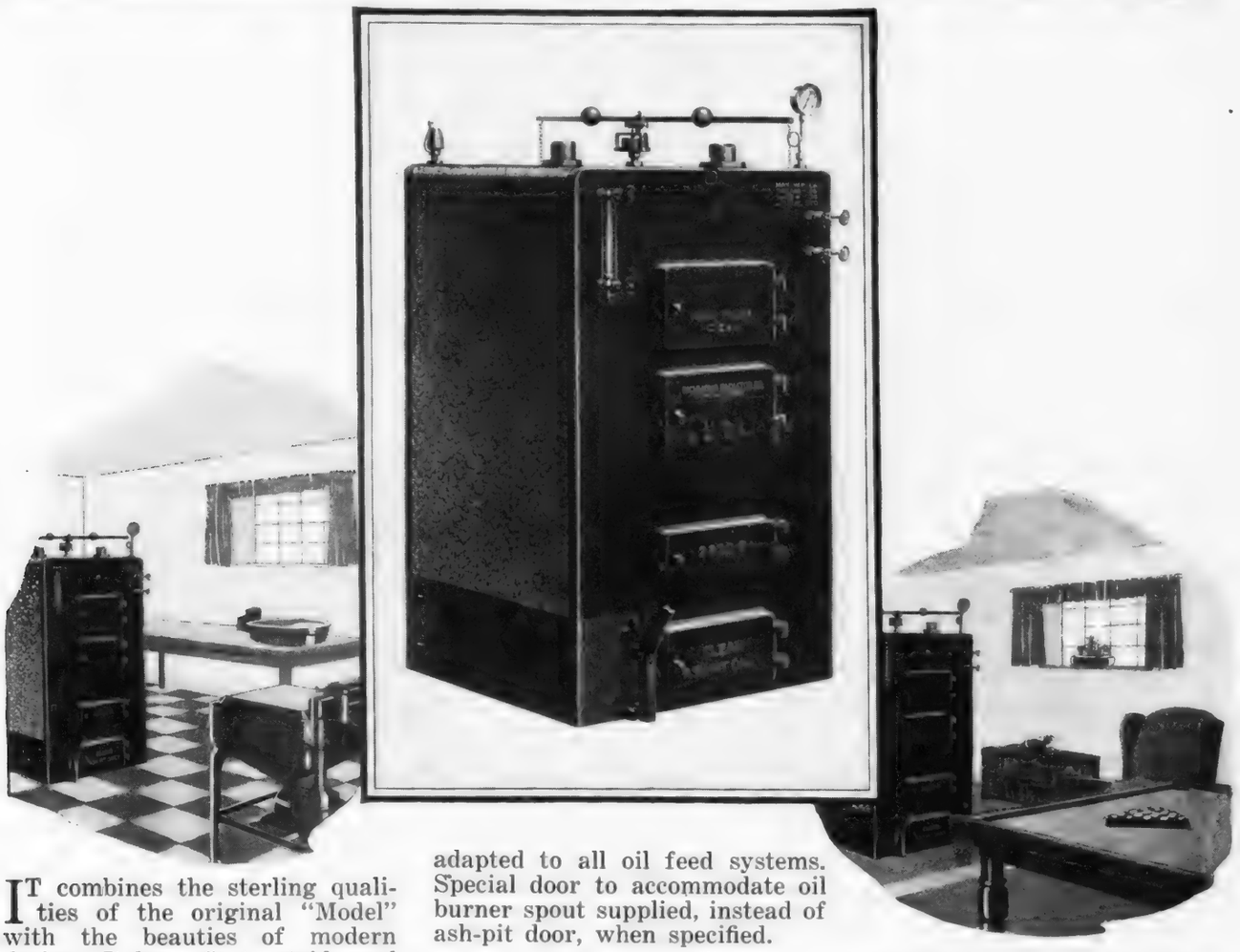
After the radiator has been set up, a front is fitted on. This is equipped with two grilles, as simple or elaborate as the pocketbook of your customer permits. Then the job is finished. The room has bountiful warmth and there is no radiator in sight or in the way. The air is thrown out into the room where it can't soil the curtains. The valve handle is extended to the window sill, giving easy control. These Robras 20-20's are the height of radiator luxury.

ROME BRASS RADIATOR
CORPORATION

ONE EAST FORTY-SECOND STREET . . . . . NEW YORK

a new "RICHMOND" MODEL boiler

~a thing of beauty in black and gold~



IT combines the sterling qualities of the original "Model" with the beauties of modern design. It has *effect* outside and *efficiency* inside. It looks well in the basement and is thoroughly at home in a blizzard. It is beautifully finished in black and dull gold. In appearance and function it is clean cut in every respect.

The new Richmond-"Model" is an end-fired boiler with the same direct flue travel of the famous side-feed Model. It is built in sections — placed vertically from front to rear.

Even soft coal is burned smokelessly. Combustion is thorough. Its perfect insulation of air-cell asbestos provides maximum heat power from fuel consumed. This boiler is also easily and perfectly adapted to all oil feed systems. Special door to accommodate oil burner spout supplied, instead of ash-pit door, when specified.

Range of Sizes

The new Richmond-"Model" is made in three popular width sizes. Grate sizes are 15-in., 22-in., and 36-in. widths. Steam boilers have a capacity of from 300 to 4,500 feet. Hot water capacities range from 500 to 7,500 feet.

Details Are Ready

A convenient coupon is provided below. We shall be glad to mail you engineering data and construction details on request.

COUPON

RICHMOND RADIATOR CO., Inc.,
1480 Broadway, N. Y.

Please send me catalog and data on new Richmond-"Model" Boiler.

Name .....

Address .....

H.V.

RICHMOND RADIATOR COMPANY

INCORPORATED

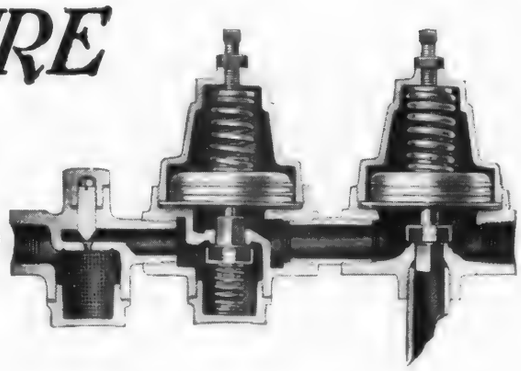
Executive Offices: 1480 Broadway, New York *Boiler Factory*: Norwich, Conn.

BRANCH OFFICES:

Chicago.....1010 Wrigley Building
Philadelphia....2241 North American Street
Boston.....460 Park Square Building
Cleveland.....Cedar Ave. and Ashland Road

The KAINER PRESSURE GOVERNOR FOR

HOT WATER HEATING SYSTEMS



A Profit to You and Your Customer

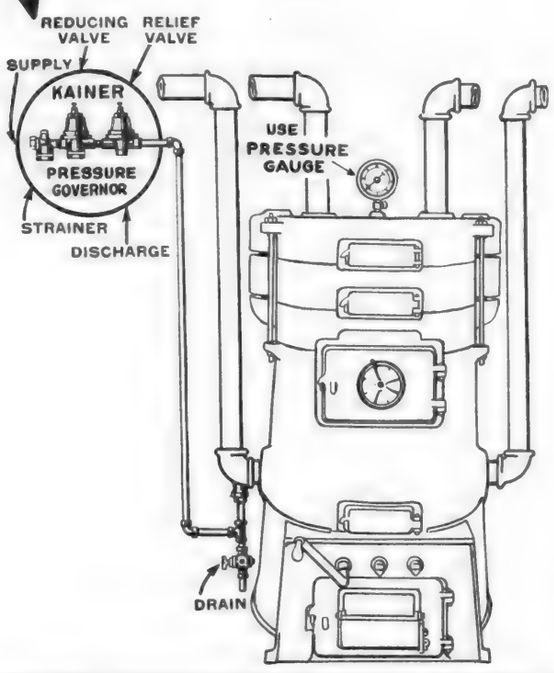
When you explain to your customer that you can make his hot water heating system less costly to install, less expensive to operate and safer with the Kainer Pressure Governor, you can be certain of his approval of its installation. This saving for your customer means a profit to you.

The Kainer Pressure Governor eliminates costly expansion tanks. It is a simple, safe and accurate device for pressure reducing and relief service on all hot water heating systems. It comprises an assembly of two valve units and a combination filter and regulator. One valve unit is for pressure reducing service, and the other for pressure relief service—connected by close nipple.

The entire governor and its very few working parts are of cast or phosphor bronze construction, eliminating the possibility of rust or scale formations.

The Kainer Bellows Diaphragm is used in both valve units. It is a very unique device conforming to the latest engineering practice. Extremely sensitive and thoroughly tested for all working pressures. It contains no material requiring service or replacement.

The governor is tested at 60 pounds pressure and set at the factory to maintain 10 pounds on the system and to relieve the system when the pressure due to expansion reaches 30 pounds. Each valve unit has a set screw at the top of the bonnet permitting of a very quick and easy adjustment should a change of adjustment be desired.



A typical installation of the Kainer Pressure Governor is given on the diagram showing the simplicity of a Kainer Governor layout. The governor is placed at about the height of the boiler—convenient for inspection. The filter and reducing unit is connected to the water supply line; the relief unit to the return main. Either valve unit can be completely dismounted for inspection in a few seconds' time by simply removing the bonnet.

Write us at once for our dealer proposition. Let us show you how to greatly increase your profits and to offer your customers a device which really relieves them of all worry about their hot water heating systems.

KAINER & COMPANY
CHICAGO
761-763 Mather Street
Manufacturers of
HARDWARE SPECIALTIES

COIL

STEEL HEATING BOILERS AND WATER HEATERS

FOR OIL BURNING

Equally Efficient with Coal

The following letter from Walter R. Garvin, Plumbing and Heating, Glenside, Pa., is self-explanatory:

"I have six Coil Boilers working on oil burners as well as many with coal.

When selling an oil burner, I always try to sell a Coil Boiler if possible. The Boiler has plenty of combustion space and heating surface.

As compared with the average job, I can count on an oil saving of better than 25%. This, I believe, is particularly due to the fact that the Coil Boiler generates steam and raises the water temperature almost instantly the burner goes into operation."

WRITE FOR CATALOG

MONITOR BOILER COMPANY

1505 Race Street :: Philadelphia, Pa.

Where should the Keystone of Responsibility be placed in transactions involving the manufacture of heat transfer equipment? Should the owner be penalized for faulty construction? Should the engineer be blamed for improper execution of his design? ¶ Heat Transfer Products, Inc., prefers to assume full Responsibility for the design, manufacture and operation of all equipment built in its shops. For this reason the entire structure of this organization was conceived and built with but one purpose in mind—to manufacture the finest type of heat transfer products which could be built—regardless of cost. ¶ The fact that our costs are consistently lower is due to unified production and operation. ¶ By producing in our own plant practically all units which go into heat transfer equipment, we control all operations from raw materials to finished product. ¶ With engineers and shop superintendents working harmoniously side by side—each assuming responsibility for his particular division—the entire organization becomes one mighty machine designed for efficiency, geared for speed and operated by men of outstanding ability in the industry. ¶ If you are seeking ability instead of alibis, performance instead of promises, deliveries instead of delays when you purchase heat transfer equipment, let Heat Transfer Products, Inc., build it. ¶ When you consult our engineers about your problems you have taken the first step toward the proper design and selection of materials for your needs. ¶ And when you contract with us you may do so with the full assurance that you are dealing with a manufacturer of unquestioned

RESPONSIBILITY

Engineering data and estimates will gladly be furnished on equipment for the following applications:

Power Plants	Chemical Plants	Refrigeration
Oil Refining	Air Conditioning	Textile Mills
Gas Plants	Heating and Ventilating	Laundries, etc.

Send for information on the type of apparatus in which you are interested.

HEAT TRANSFER PRODUCTS, INC.

A division of THE STATEN ISLAND SHIPBUILDING COMPANY, 90 West Street, New York

You will know the
MASTER STILLSON
by the new
RED LACQUER HANDLE
and by the
diamond trade-mark

TRADE MARK STILLSON REGISTERED U.S. PATENT OFFICE

which proves it's
GENUINE

MADE FOR MASTER CRAFTSMEN

The new Walworth Master STILLSON stands out like a lighthouse from all other pipe wrenches. You'll know it anywhere by its bright red handle, by Dan Stillson's diamond trade mark on the jaw and by its greater toughness, lasting strength and gripping power when it goes to work.

Design, weight, balance and price are the same as before. What the red handle identifies for you is a new hardness and toughness of steel from the tip of the handle to the last tooth in the jaw. And that's what counts for *you* when the new Master STILLSON goes on the job.

WALWORTH

Walworth Company, General Sales Offices: 51 East 42nd St., New York
Plants at Boston, Mass.; Kewanee, Ill.; Greensburg, Pa., and Attalla, Ala.

Distributors in Principal Cities of the World

Walworth Company, Limited, 10 Cathcart St., Montreal, P. Q.
Walworth International Co., 11 Broadway, New York, Foreign Representative

Base your judgement of insulation value on *facts*

and your choice will *unquestionably* be Banroc

These Facts Tell the Story of Banroc

FACT No. 1 — Banroc Insulation, at a density of 12.5 pounds per cubic foot, has a thermal conductivity of 6.6 B. T. U. per square foot, per inch thick, per degree difference in temperature, in twenty-four hours (U. S. Bureau of Standards), the lowest of any commercial insulation.

FACT No. 2 — Banroc Heat Insulation will not burn. It will efficiently insulate at all temperatures up to 1200° F. (Banroc Cements up to 1800° F.)

FACT No. 3 — Banroc Heat Insulation is permanent. It will not disintegrate or deteriorate — a fact established over a period of more than thirty years of service.

FACT No. 4 — Banroc Heat Insulation can be easily and quickly applied, saving on installation cost. Tests on various types of construction have proved this fact.

FACT No. 5 — Banroc Heat Insulation is economical — in cost of material, application cost, in the heat it saves, and in its length of life.

The line on Banroc Insulation products includes an insulation for every need within its temperature range.

FACTS alone should be considered in the selection of heat insulation. Fact finders — men who go to the bottom of things — men who want to *know* before they pass their judgment, disregard claims, throw out opinions, and base their judgment on facts alone.

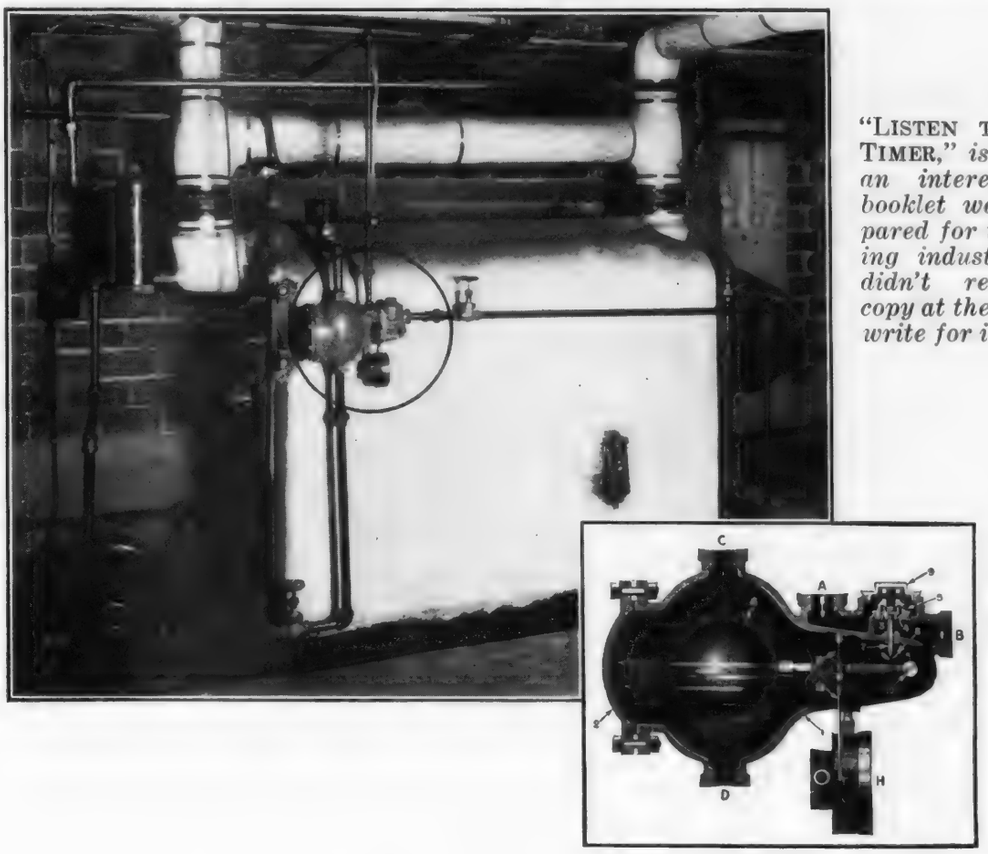
BANROC Insulation bids for your consideration on a basis of facts. Facts tell the story — facts that have been established over a period of years of actual service.

Be a fact finder. Go to the bottom of this insulation problem. Base your judgment on facts, and your choice will surely be BANROC.

BANNER ROCK PRODUCTS CO.
ALEXANDRIA, INDIANA

ORIGINATORS OF ROCK WOOL PRODUCTS

BANROC INSULATION



"LISTEN TO AN OLD TIMER," *is the title of an interesting little booklet we have prepared for the oil heating industry. If you didn't receive your copy at the convention, write for it today.*

Protect that Boiler!

Fractured boilers cause long delays, great expense, loss of property, serious inconvenience. And low water causes fractured boilers!

Protect every boiler you install with a McAlear Direct-to-Boiler Water Feeder. The McAlear will positively keep a definite amount of water in the boiler at all times. It also discharges all surplus water into the sewer.

In the case of oil burners, if for any unusual reason, the water supply should fail, the McAlear promptly cuts out the motor before any damage can be done.

All in all, the McAlear gives positive insurance against all boiler fractures caused by low water.

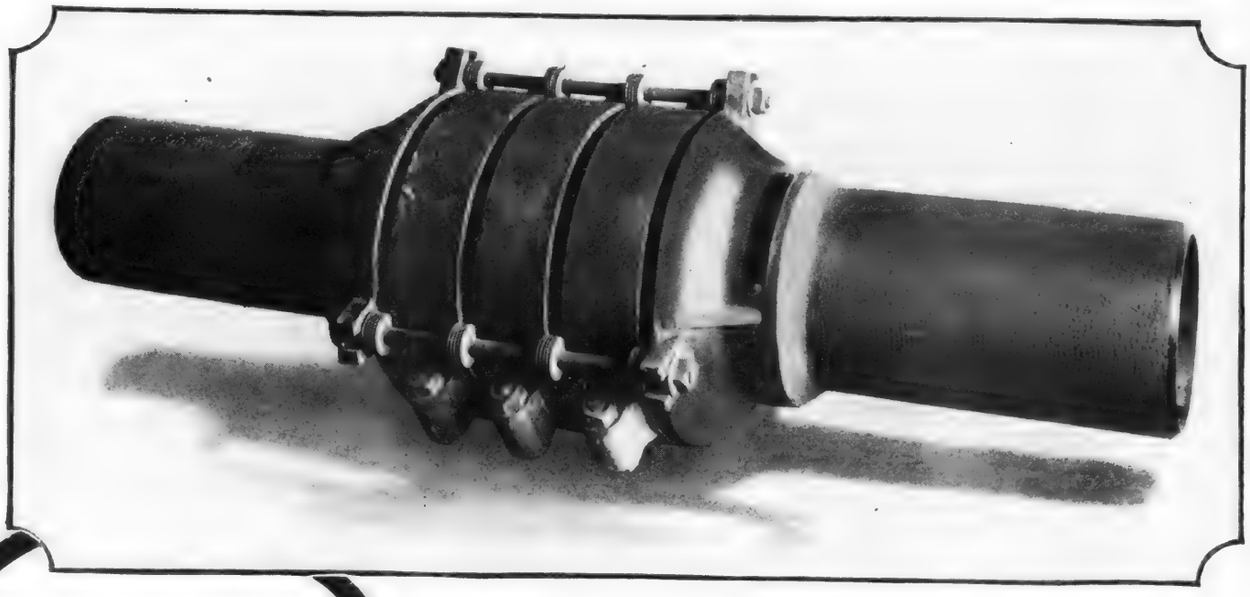
Bulletin K-1 tells the complete story of McAlear Water Feeders. Write for your copy today!

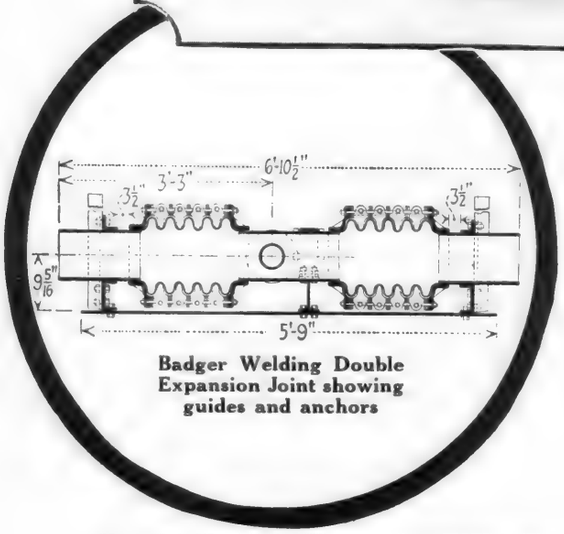
A few desirable territories are available for aggressive dealers. Write for full details.

19th and Western

McALEAR
Manufacturing Company

Chicago, Illinois





Badger Welding Double Expansion Joint showing guides and anchors

For low pressures to 40 lb. and vacuum use Badger Single or Multi-Corrugated Copper Expansion Joints. They are designed to resist shock and vibration, to protect turbine casings, condenser shells, piping, etc.

Every corrugation is uniform in contour and thickness

The expansion elements of Badger Self-Equalizing Expansion Joints are made from seamless de-oxidized copper tubes of the finest quality. The corrugations are rolled by a special process that secures uniformity throughout. Machined equalizing rings are mounted between the corrugations to distribute the movement of the element evenly among all the corrugations. The long life of the elements without any maintenance expense, makes them a paying investment on every underground and overhead steam main for working pressures to 200 lb.

Furnished in single and double units with either open pipe ends for welding directly with the pipe line or with standard 125 lb. or extra heavy 250 lb. flanges.

Badger Engineering Service

Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products: Pipe Bends, Chemical Apparatus, Copper and Sheet Metal Work, Copper Boilers.

E. B. BADGER & SONS CO.

75 Pitts Street, Boston, Mass.

New York: 271 Madison Ave. *Representatives in all principal cities* Chicago: 2831 South Parkway

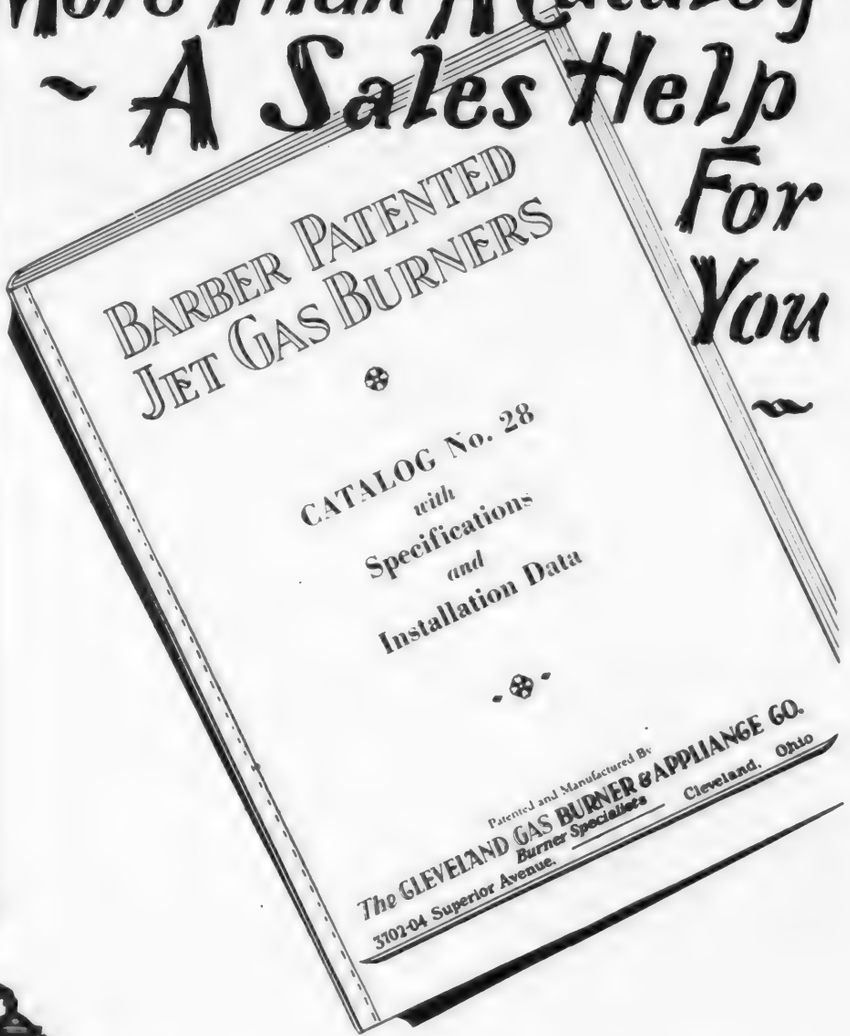
BADGER EXPANSION JOINTS

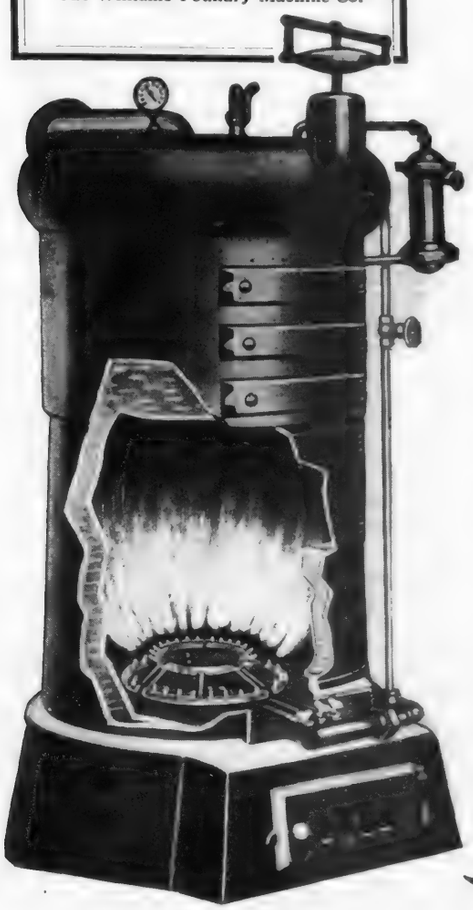
ESTABLISHED 1841 · WEATHER VANE ON FANEUIL HALL · E·B·BADGER & SONS COMPANY · TRADE MARK

Among the Manufacturers who have adopted Barber Burners as Standard in their Hot Water Heaters, Boilers and Appliances, are the following:

Akron Equipment Company
American Radiator Co.
Armbruster & Betlem
F. C. Barton Co.
Bastian-Morley Co.
Bean Spray Pump Co.
Bryan Steam Corp.
Carrier Construction Co., Inc.
Coast Heater Mfg. Co.
Champion Dish Washing Mach. Co.
Day & Night Water Heater Co.
Economy Heater Co.
The Electro Weld Co.
R. E. Fraser & Co.
Firestone Tire & Rubber Co.
Franklin Plbg. Supply Co.
Geneva Heater Co.
Gewert Mfg. Co.
E. A. Hibbs
Hoffman Heater Co.
Hollywood Water Heater Co.
Hotstream Heater Co.
Hoyt Heater Co.
Edward Katzinger Co.
John Trageser Steam Copper Wks.
Lovekin Water Heater Co.
McCann-Harrison Co.
Walter Mork Co.
Marlow Manufacturing Company
Merit Mfg. Co.
Newell Mfg. Co.
New Way Mfg. Co.
Northwestern Steel & Iron Works
The Ohio Heater Co.
Geo. F. Reichman & Co.
Safety Water Heater Co.
Sands Mfg. Co.
Schwab Boiler & Machine Co.
Snap-O-Stat Co.
Star Dee Water Heater Co.
Stinson Sales Co., Inc.
United Heater Corp.
Vernon Edler Corp.
Ward Heater Co.
D. D. Wessels & Sons Co.
The Wise Furnace Co.
Welsbach Company
The Williams Foundry Machine Co.

More Than A Catalog ~ A Sales Help For You





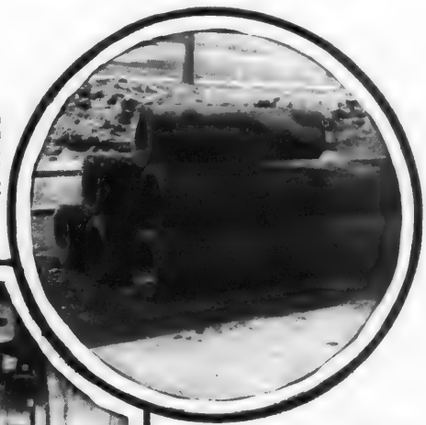
HAVE you received your copy of our *new* Catalog? If not, write for it today. It contains much valuable data and other useful information that will enable you to quickly *convert* any Coal or Oil-fired Steam, Hot Water, Vapor or Warm Air heating plant into an efficient Gas-fired system—at small cost to the user and good profits to you.

House Heating with Gas is rapidly gaining favor among home owners everywhere. Our records show that a tremendous number of Conversion Installations are made in the months of April, May and June.

Start your campaign now and carry it on through the Summer. You will cultivate a fertile field of "Prospects" that will give you a golden harvest with the first chill of Fall weather.

Our effective Sales Co-operation makes it easy for you to build up a big, permanent and profitable business with Barber Burners. Let us tell you about these Sales Helps. Go after this conversion work now! It adds another profitable source of income to your business. Write us today.

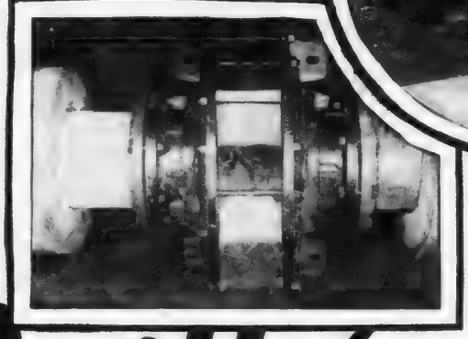
***The* CLEVELAND GAS BURNER & APPLIANCE CO.**
Burner Specialists
3702-04 Superior Avenue, Cleveland, Ohio



Cut below illustrates 18-inch ADSCO Slip-type Expansion Joint in operation at Peoria, Ill., continuously since 1902. The photograph was taken in March, 1926. So far, the joint has never leaked or been repacked.

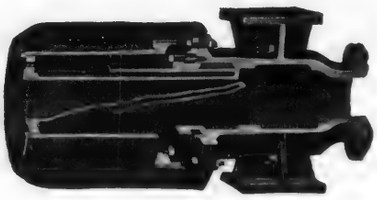
In ground 27 years

In ground 24 years

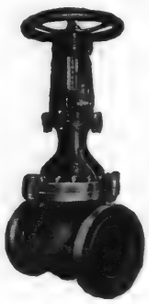


Above cut shows ADSCO Red Diamond Brand Casing, which was removed from ground after 27 years of service, to make way for a larger Red Diamond Brand Main. It was in such excellent condition that it was reinstalled in another street.

Built for Long Life



ADSCO Duplex-Sleeve Guided Expansion Joint for high pressure and superheat. Air cooled slip eliminates excessive packing trouble.



ADSCO Nelson Gate Valve for 400 pounds working steam pressure. Completely mounted with non-corrosive metal.

ADSCO Model P Variator for pressures up to 125 pounds.

Meet every requirement of:

1. Expansion and contraction in underground piping.
2. Efficiently distributing steam through economical, well insulated underground mains.
3. Properly trapping steam lines.
4. Accurately measuring steam service.
5. Dependable regulation of the pressure in individual heating systems.

ADSCO Specialties provide the solution. Designed over fifty years ago—gradually and carefully developed to the present day high standards. Tried and proved by years of service. Combine long life with minimum maintenance.

Heating engineers and contractors are invited to send us their blue prints for recommendations and prices.

Write for the ADSCO Blue Book on Expansion and other literature on Steam Distribution

AMERICAN DISTRICT STEAM COMPANY
GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

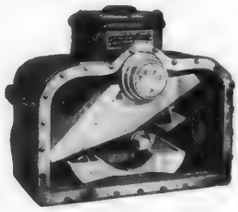
ADSCO

Specialties for Underground or Aerial Steam Mains—High or Low Pressures

Expansion Joints — Meters — Casing — Gate Valves Steam Traps — Reducing Valves

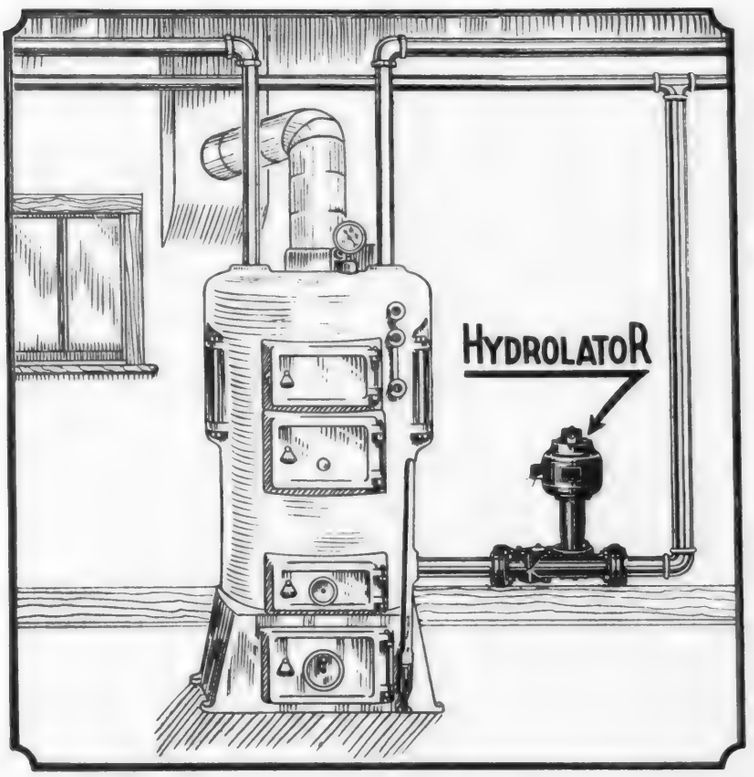
ADSCO Empire Steam Trap for low pressure. Capacity ranges from vacuum to 20 pounds pressure.

ADSCO Standard Casing Construction utilizing ADSCO (Red Diamond Brand) kiln dried wood casing.



ADSCO Simplex Condensation Meter for metering steam condensation.

The illustration shows the HYDROLATOR mounted on horizontal pipe. May also be mounted on vertical pipe. Two sizes available: Type H1½ for 1½" return line; Type H2 for 2" or 2½" returns.



The HYDROLATOR makes possible successful hot water installations regardless of whether the radiators are above, below, or on a level with, the boiler.

Do YOUR Customers Want LOWER FUEL BILLS?

OF course they do. And you can see to it that their fuel bills *do* come down—at least those of your customers who have hot water systems.

The HYDROLATOR

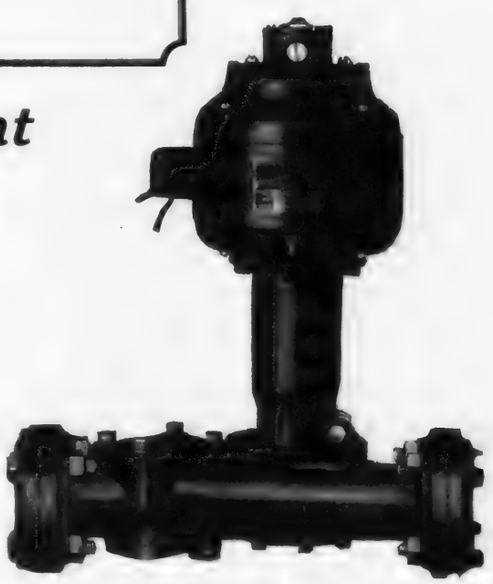
Recommend the HYDROLATOR for fuel economy on all hot water systems—new or old. A HYDROLATOR on a new system assures an efficient installation and the customer's satisfaction. Many old systems, now sluggish, "short circuited" or wasteful of fuel, can be cleared up with a HYDROLATOR—to the profit of both the dealer and home owner.

Keeps Homes Warmer

It's easy to keep homes warmer with a HYDROLATOR. The more rapid circulation naturally carries a greater volume of heat to each radiator and provides a more uniform temperature throughout the home.

Low Cost

The first cost of the HYDROLATOR is low—well within the reach of almost any home owner. Costs little to operate and soon pays for itself in fuel savings alone.



The HYDROLATOR

The Motor drives a small centrifugal pump which circulates the water at greatly increased speed. Pump rotor is rustproof. HYDROLATOR does not operate continuously. When not in operation, it does not interfere with normal flow of water.

JANETTE PRODUCTS

The HYDROLATOR
Motors, Electric
Blowers, Oil Burner
Oil Pumps
(see adv. this issue)
Sump Pumps
(see adv. this issue)
Oil Strainers

Mail the Coupon for Prices and Full Information

Janette Manufacturing Company

556-58 W. Monroe St., Chicago

Singer Bldg., 149 Broadway New York.
Real Estate Trust Bldg., Philadelphia
Harrison Sales Co. Seattle, Portland, Spokane.

HV5

JANETTE MANUFACTURING CO.,
556-58 W. Monroe St.,
Chicago, Ill.

Gentlemen:
Please send me prices and full details on the HYDROLATOR.

Name .....
Address .....
City .....
State .....

"At last! A low priced, practical steam (or air) Meter."

"Just what we've wanted."

"We'll need some of those."

Comments such as these have been followed by orders to serve over 20 different industries.

This result is only natural, for here is a simple, compact, economical Meter which accurately measures the flow of high or low pressure steam or air over an exceptionally wide range.

These Meters are used to measure steam used for heating; steam and air used in process work; steam sold to tenants or near-by buildings; for use as a test meter to check steam distribution, etc.

Install it right in the line (as a unit in 2, 3, and 4″ lines and in a by-pass line around an orifice on larger lines), read it when you please, it's "the easy way of measuring steam."

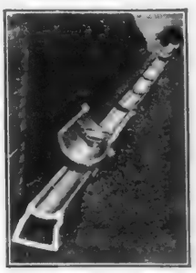
Bulletin 234 tells the whole story. You will be interested. May we send it?

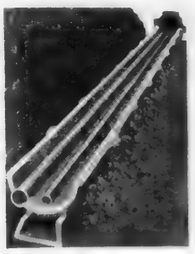
BUILDERS IRON FOUNDRY

"Builders of the Venturi Meter for 36 years"

11 Codding Street **Providence, R. I.**

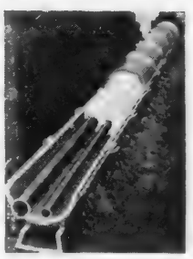
Ric-wiL Installation step by step





This series of pictures shows the ease and simplicity with which Ric-wiL is installed.

Ric-wiL Conduit *for* every heating need



THE Ric-wiL Company has combined sound engineering and practical installation with years of experience in order to bring about maximum efficiency at minimum cost, under all conditions.

Low pressure or super-heated steam—hot water or fuel oil lines—long distance distribution—lines under heavy traffic—limited capital for installation—whatever the requirements, Ric-wiL conduit service will solve your problem. Today there are four Ric-wiL types in price ranges that meet varying service requirements. Write for this information before you estimate your next job.

Be sure to get A Ric-wiL Proposal and Estimate on your Next Job.

The Ric-wiL Company

Originators of Waterproof Conduit Filler

1567 Union Trust Bldg., Cleveland, O.

Offices in Principal Cities

When local conditions present a Problem

Let your good judgment select the Webster Ignition Transformer as the logical unit to solve electrical problems offered by various localities ... There are important oil burner ignition improvements embodied in the Webster Transformer ... Each one of these has been designed to overcome conditions which you have encountered ... A great majority of the leading oil burner manufacturers have adopted the Webster Transformer for dependable ignition service on their products ... We invite you to call upon the Webster engineering staff for interesting details of Webster Ignition Transformer construction ... Professional advice will be given gratis.

WEBSTER ELECTRIC CO., *Racine, Wis.*

"Specialists in Oil Burner Ignition"

Webster Ignition Transformer

The Webster Ignition Transformer can be furnished with either single or double high tension terminals, in a variety of voltages and frequencies.

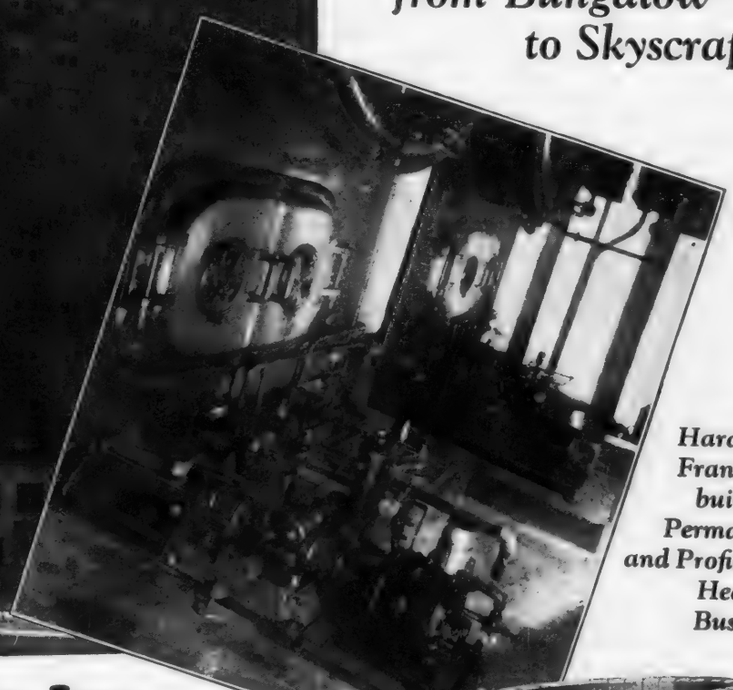
HARDINGE FUEL OIL HEAT

in the Flamingo Hotel, Chicago

A twin installation that will appeal to every heating engineer.

Our two models, Domestic and Industrial, in 12 different sizes and combinations, enable you to make correct installation in any building—

from Bungalow to Skyscraper



The Hardinge Franchise builds a Permanent and Profitable Heating Business

Hardinge Brothers, Inc.

Manufacturers of Precision-Built Machines for 38 Years

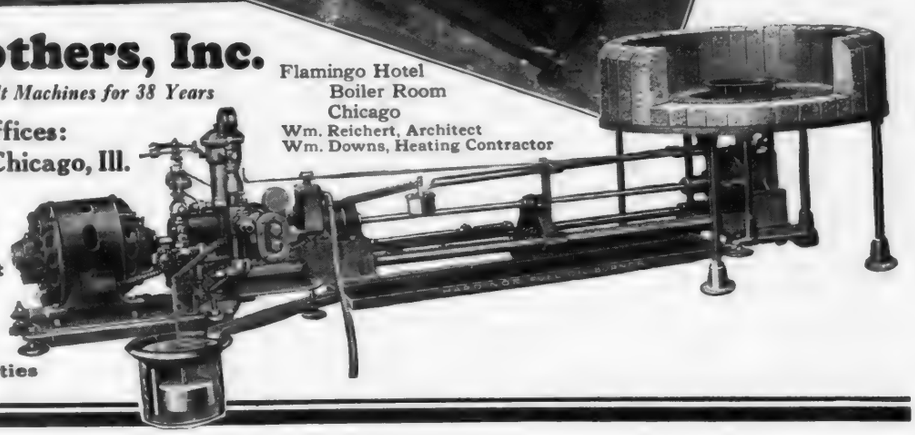
Factory and General Offices:
4149 Ravenswood Avenue, Chicago, Ill.

Factory Branches:

CHICAGO
Michigan Avenue at Ohio Street

BOSTON
839 Beacon Street

Distributors in All Principal Cities



Flamingo Hotel
Boiler Room
Chicago
Wm. Reichert, Architect
Wm. Downs, Heating Contractor

MEMBER OIL HEATING INSTITUTE OIL HEAT AS BENEVOLENT AS SUNSHINE

$3,000 to $10,000 a year

You can earn as an ABC agent.

No investment required; no showroom; no burdensome contract—only ambition. Have you got it?

If you are a man of good character and willing to work, write us today. By following our sales plan you can make a handsome income.

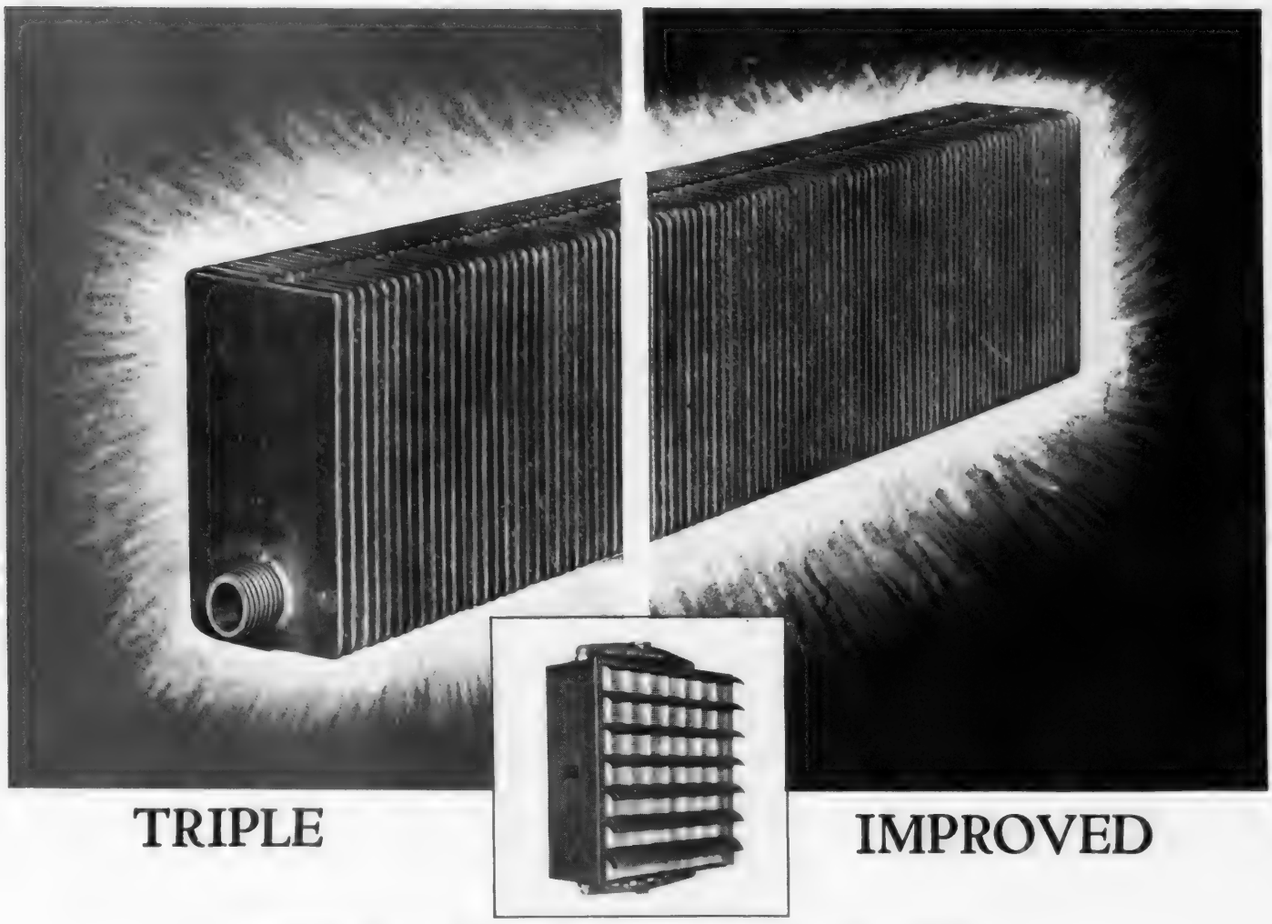
Automatic Burner Corporation
312 North May Street
Chicago

ABC Automatic Oil Burner

THERMAL UNITS

Serve Better

IN HEATING IN COOLING



TRIPLE IMPROVED

INTEGRAL THERMAL SECTION

Responsible for Amazing Performance

THE remarkable service Thermal Units are giving in both the heating and refrigeration field is due to three basic differences in the Thermal element—used solely and exclusively in both Thermal Unit Heaters—and Thermal Refrigerating Units.

These improvements are:

1. *Integral Casting.* The core and extended surfaces are a one-piece casting.
   Advantages—Leak-proof, greater strength, no penetration or conduction loss between core and extended surfaces.
2. *Special Aluminum Alloy.* Light in weight—non-corrosive, and can not be injured by freezing in service. Also presents more extended surface for heat transference in a given weight.
3. *Streamline Design* of core and fins permits freer circulation of air, and longer range air delivery.

If you have a heating or cooling problem, write or call on Thermal Units Company (a subsidiary of Mechanical Manufacturing Co.) Pershing Rd. and Loomis St., Chicago.

Eastern Office
30 Church Street
NEW YORK CITY

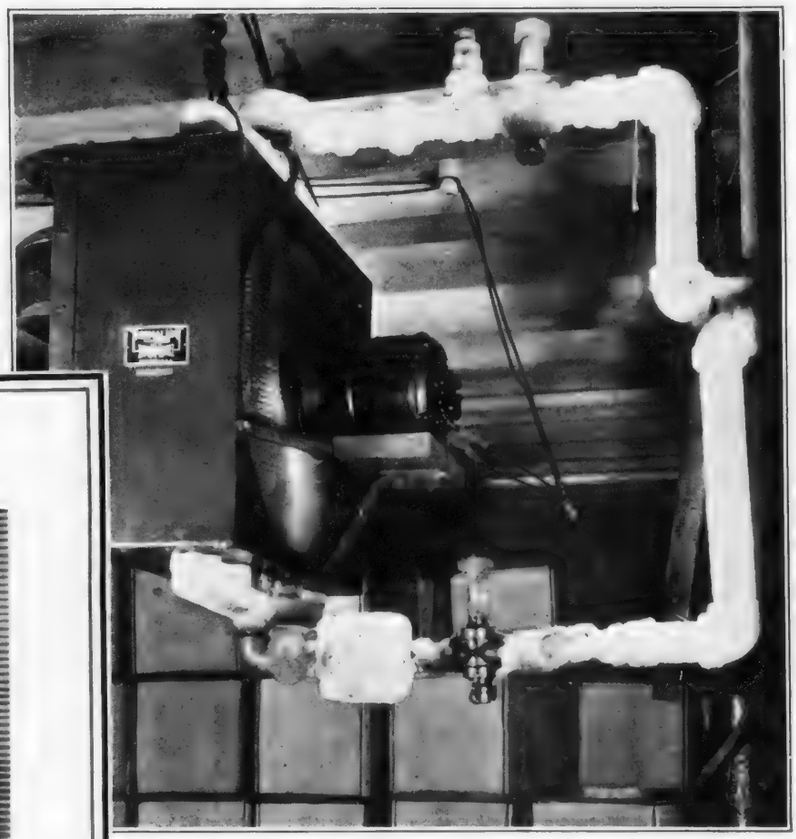
THERMAL UNIT
INTEGRAL SECTION
MECHANICAL

New England Distributors
BRAMAN, DOW & CO.
239 Causeway St., Boston Mass.

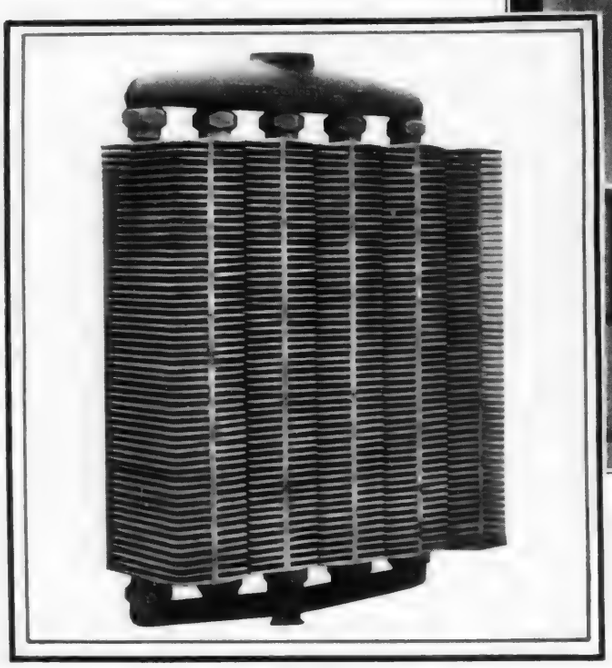
Put the Air to Work!

Thermal Units *and* Blast Section Assemblies

For
ALL HEATING
and COOLING
Purposes



Thermal Unit operating in cold storage plant. Note that while pipes are frosted—none appears on the Unit



Blast Section Assembly

YOU as an engineer know the principles of Heating and Refrigeration. You've learned from sad experience, however, that you can not always attain the result you seek, because of lack of equipment to fully meet your requirement.

We believe that an investigation will prove to you that *Thermal Units* ARE dependable.

Why you should investigate Thermal Units

They will stand pressure up to 250 lbs. They are virtually indestructible. They are leak-proof. They eliminate much of the liability to frostation.

Owing to design of section and core they will deliver great volumes of air great distances.

We are Glad to Prove Our Claims

Give us an opportunity to prove any or all of the foregoing statements. If you have a heating or cooling problem, consult our engineering department, or send blueprint of the establishment on which you are working—nature of equipment now installed, and nature of the problem. No obligation is entailed, address Thermal Units Company, (Subsidiary of The Mechanical Manufacturing Company) Pershing Road and Loomis Street, Chicago.

Eastern Office
30 Church Street
NEW YORK CITY

THERMAL UNIT
INTEGRAL SECTION
MECHANICAL

New England Distributors
BRAMAN, DOW & CO.
239 Causeway St., Boston, Mass.

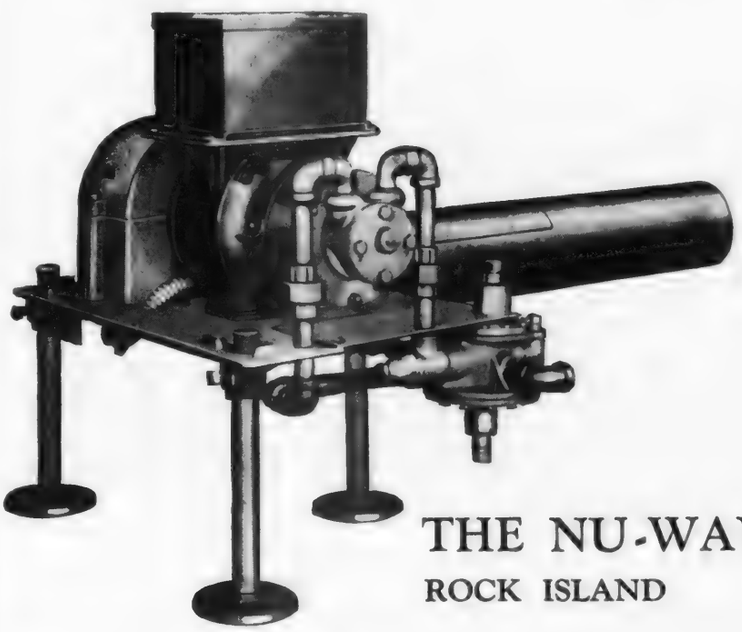
AUTOMATIC OIL BURNER

Nu-way

FOR HOME HEATING

Automatic Oil Burners For 1928 Are Equipped With 6 New Sales Features

1. **Quieter**—A quiet fire has been developed that eliminates all flame roar.
2. **No Extra Pump**—Supply pump is now part of burner equipment. Cost and installation of extra pump eliminated.
3. **Built in one unit instead of three**—Controls and pump no longer extra units.
4. **Size of fire Constant**—Not affected by change in fuel. Flame can be adjusted to suit shape of fire pot.
5. **Burns less Oil**—Improved combustion makes hotter fire and heats more quickly.
6. **Control of Atomizer** pressure greatly simplified.



1928 models made in 3 sizes with a heating capacity of from 500 to 8000 feet of steam radiation. Standard Nu-Way line in 6 sizes.

Write for Prices and Terms

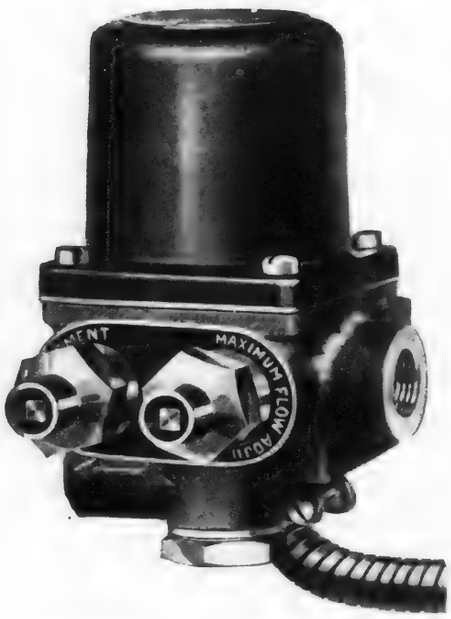
THE NU-WAY CORPORATION

ROCK ISLAND ∴ ∴ ILLINOIS

New

ARCO SOLENOID VALVE

For Oil Burners, Small Gas-Fired Units, Small Refrigerating Units, Etc.



New No. 682 *Arco Solenoid* valve for any 110v. or 220v. current. Cast brass outlet box, integral part of valve body. ⅜ inch pipe connection. Connecting wires at bottom of instrument.

THE new No. 682 *Arco Solenoid* Valve has a wide adaptability and can be used with any *Mercoid* Control or can be operated with hand switch.

For Oil Burners

The *Arco Solenoid* Valve is designed for high and low flame adjustments, operating on the metering valve principle with ample power for pressures up to 50 lbs. It provides positive cut-out of oil supply operating simultaneously with the starting and stopping of the motor.

For Small Gas-Fired Units

Arco Solenoid Valve may be employed with *Mercoid* Control—or hand switch operated electrically—to open and close the gas line in small gas heaters of all kinds—water heaters, glue pots, solder pots, etc.

In Refrigeration

Arco Solenoid Valve is applicable to operation on small water-cooled refrigerating units to control the flow of water. The Valve opens when the machine is running to afford proper cooling and closes when the machine stops. Has ample power to operate against water pressure. *Special Solenoid* Valve can be furnished to operate on 150 pounds.

Arco Solenoid Valve can be obtained with both high and low adjusting pins or with either one or both omitted.

ALSO—*Arco Solenoid* Valve can be used for compressed air up to 150 pounds to open and close compressed air line.

Send today for illustrated Bulletin comprehensively describing the new Solenoid and its uses.

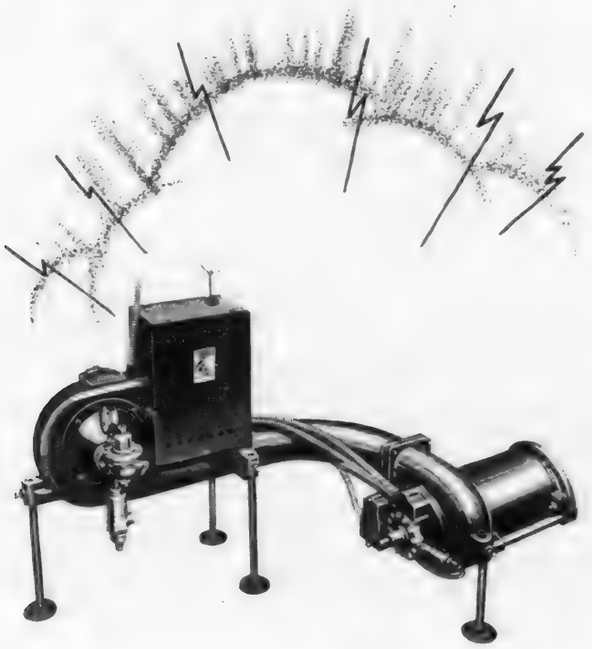
AMERICAN RADIATOR COMPANY

ACCESSORIES DIVISION, DEPT. H

40 W. 40th Street New York, N. Y.

Makers of IDEAL Boilers, AMERICAN Radiators, ARCO Tank Heaters, VENTO Ventilating Heaters, AIRID Air Valves, MERCOID Controls and devices for drying, humidifying, cooling and refrigeration.

We're Swinging into the Best Year in Electrol History



After a year of gains in number of burners sold, in number of new dealers, in sales by individual dealers, and in volume of business in dollars, Electrol is swinging into the biggest year in its history.

If you attended the oil burner convention in Chicago, it didn't take you long to see that Electrol held the spotlight of interest. The Electrol booth was the "busy corner" of the exhibit.

Many new dealers and distributors have come into the Electrol fold. They're invariably men of long experience in the oil burner business, recognizing now the quality and dependability of the Electrol Automatic Oil Burner. And they are going to make money selling it.

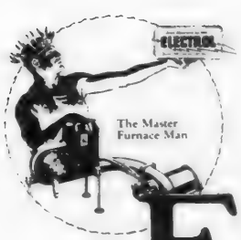
Will you be among them?

Electrol's 1928 dealer program is made-to-order for successful selling . . . and has been eagerly accepted by Electrol dealers everywhere.

The new sales plan is built around dealer - to - consumer advertising which gets prospects and closes sales. A definite plan of action . . . something definite to do at a definite time. Newspaper advertising is part of it. And the whole plan is backed by dominant national advertising.

May we tell you about these plans in detail? And about the liberal money-making Electrol franchise? Write today for full details.

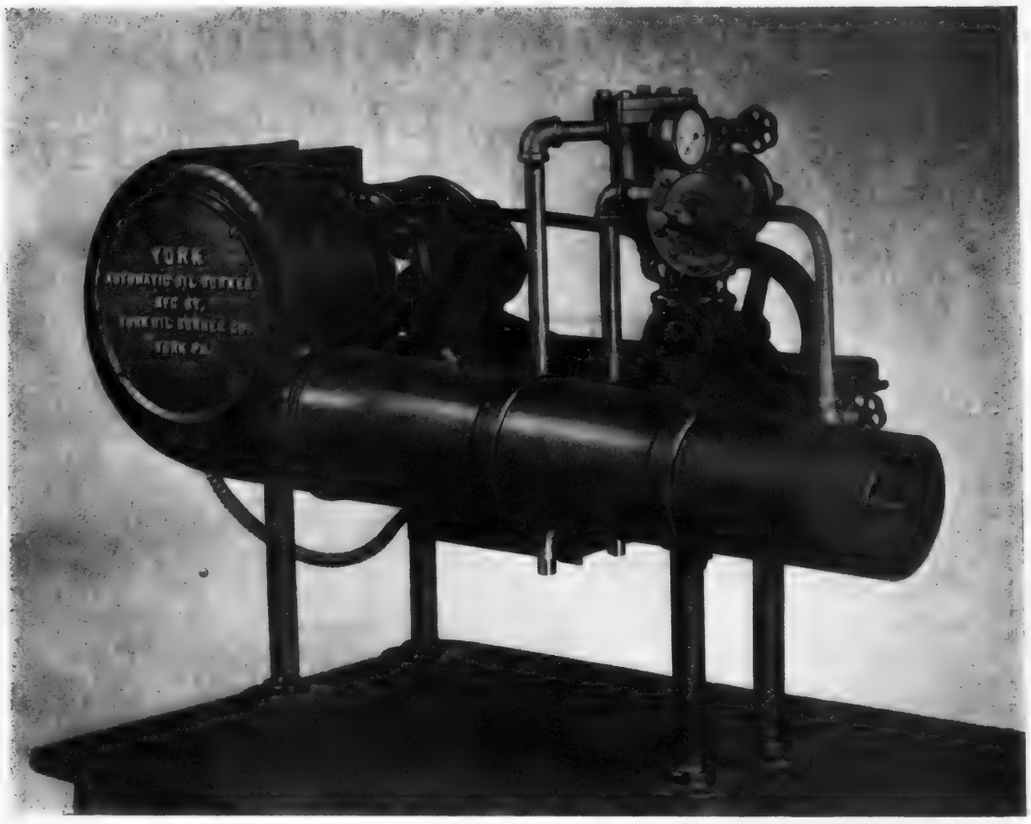
Electrol Inc. of Missouri
177 Dorcas St., St. Louis, U.S.A.



ELECTROL

The OIL BURNER with *The Master Control*

LISTED AS STANDARD BY THE UNDERWRITERS' LABORATORIES, AND BEARS THEIR LABEL



Oil Heating Simplified—

$10,000 per year can be made selling York Automatic oil burners in cities of 50,000 population. A proportionate amount in larger and smaller cities.

Following are facts about York Automatic:

158 sold in York in last year and a half.

An average of a burner a day being sold this season.

98% of installations have cost less than coal to operate.

Service record shows one service call per year per machine.

All-electric ignition. Extremely quiet operation.

We early recognized the fact that it was folly to sell any but the highest grade burner that can be produced. Yet we knew that if this burner could be sold at a price anyone could afford, it would be almost without competition in the burner field. After nine years of building oil burners we have so cut production and selling costs that, in our 1928 model York Automatics we are offering a burner of proven quality at a price to the trade of little more than half that for which similar burners are being sold.

May we give you more detailed information and quote prices?

Specifications

Century Repulsion-Induction motor.

Webster electric transformer.

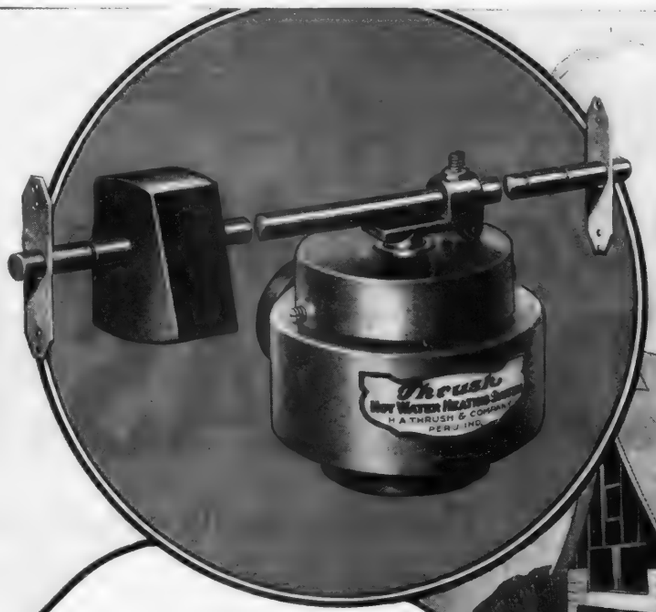
Tuthill Pump.

Absolute Contactor controls.

York nozzle, York blower and fan, York strainers, York diaphragm pressure-regulating valves. All other parts York built. Extra-heavy brass used in pipe, fittings, strainers, valves, nozzle, etc. Finished with two coats of Duco, red and green and all brass highly finished and polished. Supplied with asbestos lined sheet-metal cover.

YORK OIL BURNER COMPANY

21 West Clark Avenue, YORK, PA.



Makes *any* Hot Water Job *work* better!

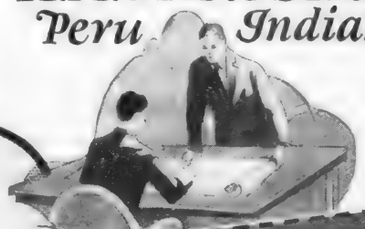
BETTER installation—more satisfaction for your customers—that's the secret of success in the heating business. One customer pleased means many more prospects. That's why Thrush System is a business builder.

Beat Competition!

Thrush Equipment makes a closed regulated Hot Water Heating plant from any unregulated gravity job—yet because of reduced pipe sizes and less labor, often costs no more. Only six feet of pipe and eight fittings needed. You can forget about free service calls when Thrush System is on the job.

Write for catalog now!

H. A. THRUSH & CO.
Peru Indiana



Economy Flexibility Easy Control Mildness Easy Installation

And a Workable Sales Plan.

Coupon

19

H. A. Thrush & Co.,
Peru, Ind.
Send me your illustrated catalog and prices together with details of the selling helps you offer. Tell me about Thrush Engineering Service.

Name

Address

THRUSH SYSTEM
OF HOT WATER HEATING

CAPITOL

—and Now Union Nuts of FORGED BRASS!

The principally used sizes of Capitol Radiator Valves and Elbows are Equipped with forged brass Union Nuts!

The Union Nut of Radiator Valves and Elbows often must correct minor errors of installation. This nut must therefore have exceptional strength for it may be used to pull the radiator closer to the pipe line, or if a riser is not exactly straight the nut is called on to force the pipe to a proper connection with the radiator. Such adjustments cause a terrific strain—and this is why the principally used sizes of all types of Capitol Radiator Valves and Elbows are now equipped with Union Nuts of FORGED BRASS —nuts that have double the strength of the ordinary cast brass nut.

Write for new Capitol Catalog showing complete line.

Capitol Steam Union Radiator Valve No. 41, shown at the left is equipped with forged brass Union Nut.

Michigan Smelting and Refining Co. now operating Capitol Brass Works.

CAPITOL BRASS WORKS

MANUFACTURERS OF BRASS VALVES, BOILER TRIMMINGS AND PLUMBERS' BRASS GOODS

DETROIT, MICH.

KIELEY

For Pressure Control

Architect
Cass Gilbert
New York City.

Heating Contractor
Baker Smith & Co.
New York City.

Associate Engineers
Meyer, Strong & Jones, Inc.
New York City.

THERE is a tendency today among large corporations to build Central Office Buildings that reflect their character and business principles.

This beautiful building—the main office of the New York Life Insurance Company—is an example. Built on the site of historical Madison Square Garden, overlooking Old New York, it reflects beauty and refinement.

Naturally, in selecting the equipment, High Quality and Reputation were determining factors.

Kieley & Mueller Pressure Reducing Valves and other Specialties are installed and will control the entire Heating System. Every ounce of steam for this building will pass through Kieley & Mueller Valves.

KIELEY & MUELLER, Inc.

34 West 13th Street **New York City**

New Edition of Bulletin No. 14

Trane Bulletin 14 contains valuable data on vapor and vacuum heating. It includes complete descriptions of Trane Bellows Radiator Traps, Trane Bellows Packless Valves, and the complete line of Trane specialties, for vapor and vacuum heating systems.

The new edition, now ready for distribution, contains added information on recent developments in the Trane line — the Thermostatic Drip Trap, New Quick Vent, New Valves, etc.

Dirt Strainers Now Available

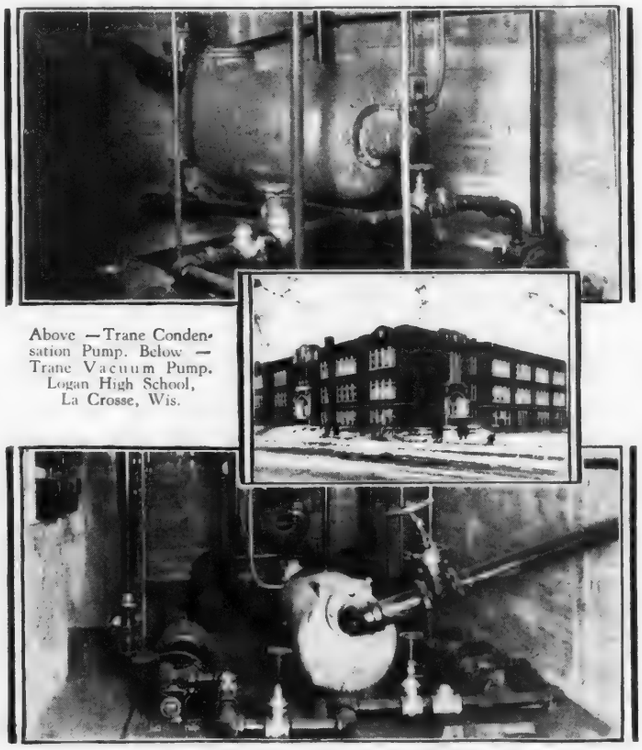
Dirt strainers of Trane manufacture — sizes ½", ¾", 1" and 1¾" — are recommended as substitutes for dirt pockets on all main drips, riser drips, and unit heaters. Adaptable to either horizontal or vertical pipe lines.

Write for a copy of the new Bulletin 14

Trane Bellows Packless Valve

Trane Bellows Radiator Trap

"..... in a neat and workmanlike manner"



Above — Trane Condensation Pump. Below — Trane Vacuum Pump. Logan High School, La Crosse, Wis.

Engineers and Architects Know What to Expect When They Specify Trane Pumps

Trane Pumps help any heating system deliver the promised performance—and a little bit more. The completed installation carries out the ideas of the man who planned it and prepared the specifications. The owner and engineer alike are pleased when they inspect a Trane-equipped job.

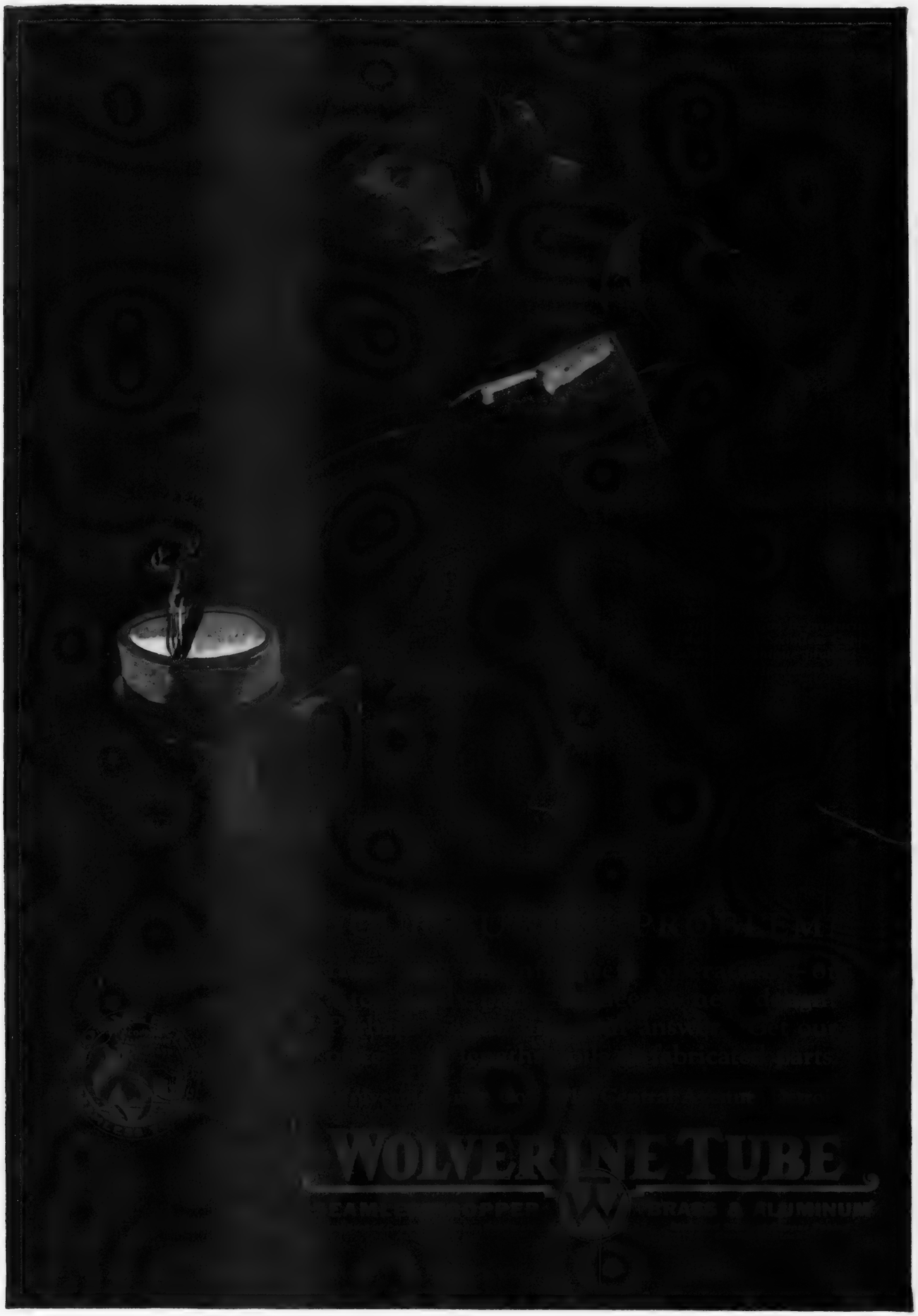
Trane Pumps are designed to give a well-balanced installation in actual service. No "feature" receives too great emphasis at the expense of all-round results.

Write for Bulletin 20 containing complete facts.

THE TRANE CO., *206 Cameron Ave., La Crosse, Wis.*

HEAT CABINETS **TRANE** CONCEALED HEATERS

··· PUMPS AND HEATING SPECIALTIES ···


WOLVERINE TUBE
COPPER
ALUMINUM

Quality—

B&J

The Sign of Quality

COMPARED with the other items in the total cost of any building the price of even the best heating system is exceedingly small, yet no article of equipment governs in greater measure the comfort in residence, office building, industrial plant, church, school or other structure.

The *degree* of comfort is determined largely by the QUALITY of the heating apparatus installed. The price of a heating system is likewise determined largely by its QUALITY. Yet there is very little difference in dollars and cents between the price of the *best* heating system and those not so good.

QUALITY does cost more than mediocrity, in a heating system as in other things, but it pays—in comfort and convenience, in fuel economy, in quietness, in efficiency of operation and permanency.

BARNES & JONES do not claim to have the "cheapest" heating apparatus (to install) but they do maintain the right to stamp their products with the mark of QUALITY. Throughout 30 years of experience in the development of heating equipment, QUALITY has been their goal.

Barnes & Jones

MODULATION VAPOR AND VACUUM HEATING SYSTEMS OF PROVEN QUALITY

128 Brookside Avenue
Jamaica Plain, Boston

101 Park Avenue
New York City

Man cannot live by price alone

TAKING jobs on a competitive basis may seem the only way to keep in business. As a matter of fact, it is the quickest way to get out of business.

Figures have a strange, remorseless way about them. Five and five make ten—always have—always will. Fifty dollars worth of material plus fifty dollars worth of labor means one hundred dollars, and the only way it can be made ninety dollars is to cut ten dollars worth of value. That ten dollars may be worth many times that amount to your customer. It may represent the difference between the continuing protection of ARCO Packless Valves and the ever-present menace of cheap valves.

If you install cheap valves and damage results to the owner's property, your reputation gets a "black eye." Your customer will inevitably come back at you with the statement that if you had told him the chances he was taking for an insignificant few dollars he would have insisted upon the protection of ARCO Packless.

You cannot expect your customers to know the difference unless you tell them. If you are to get jobs at a preference you must talk something else besides price. And here is something on which to hang a conversation, build a reputation, and honestly justify a profit on the job.

ARCO Packless Valves are made in angle, corner and globe patterns, of wheel or lever handle construction, for steam, water, vapor or vacuum installations.

ARCO Packless Valves protect your customers against leaks and annual repacking expense. Their first cost is their only cost. Their smart appearance harmonizes with the most attractive surroundings and they open and close with one smooth turn of a cool handle. They are priced so that you may employ them on every job—large or small for new installations or the modernization of old.

Individualize your installation by having your name etched in nickel on the black dial. Identify your work with the satisfaction the customer is bound to experience with an ARCO Packless Valve Installation.

AMERICAN RADIATOR COMPANY

ACCESSORIES DIVISION

40 W. 40th Street New York, N. Y.

Makers of IDEAL Boilers, AMERICAN Radiators, ARCO Tank Heaters, VENTO Ventilating Heaters, AIRID Air Valves, MERCOID Controls and devices for drying, humidifying, cooling and refrigeration.

CON-TAC-TOR

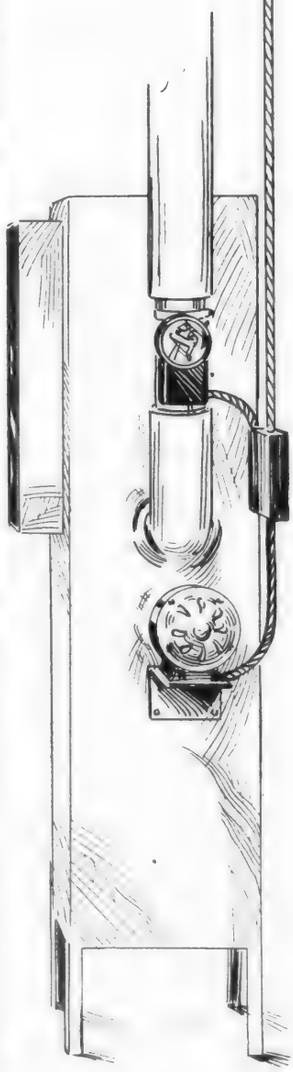
Give Your Unit Heaters A REAL CHANCE!

—Make Them Automatic—

IT'S not impossible to operate Unit Heaters successfully without automatic controls, but usually the results are not what they should be.

With manual control, the room temperatures vary over wide ranges—first too warm then too cold—because human forgetfulness or just plain laziness lets the fan run too long and then rest too long. Such operation is not only wasteful of your fuel but causes the occupants of the room discomfort—and this too is costly in efficiency of your labor.

Con - Tac - Tor Controls will simply and dependably eliminate these conditions at relatively low cost. They can be added to systems now operating or built in with new installations. Investigate now before cold weather is here. Enjoy comfort and a saving next winter.



Send in this coupon for UNIT HEATER Control information.

Name .....

Street .....

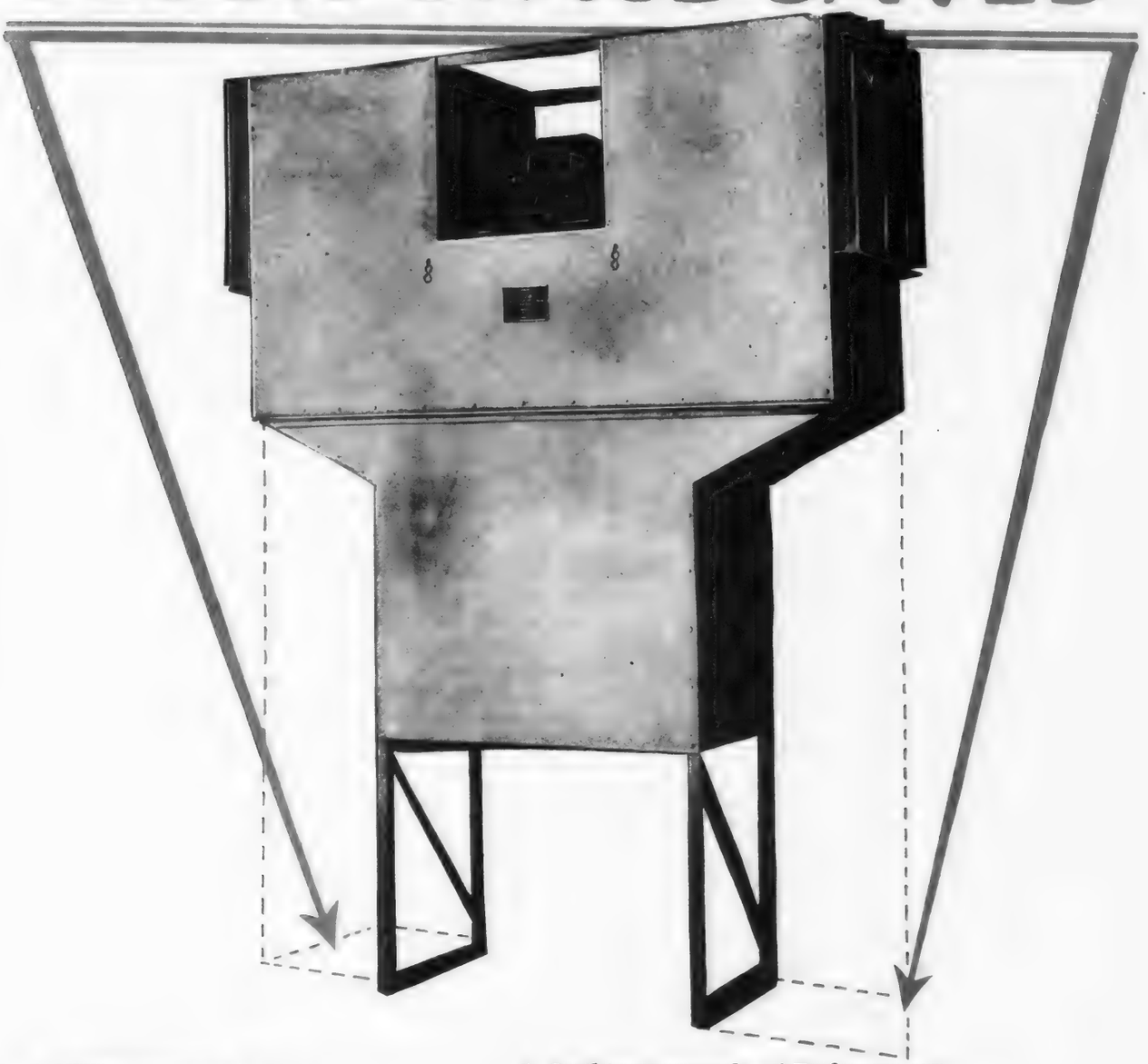
City .....

HV 528

ABSOLUTE CON-TAC-TOR CORPORATION

ELKHART, INDIANA

FLOOR SPACE SAVED



A Striking example of Refinement in

TWINFAN Unit Heater Design

The illustration plainly shows the reduced floor space occupied by the improved TWINFAN Unit Heater. The base construction has been reduced to the smallest possible size, consistent with an air inlet of ample area.

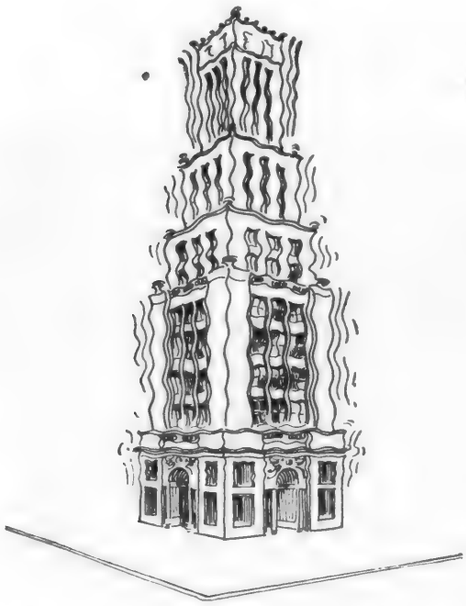
The improved TWINFAN Unit Heater features many other refinements as important as this one of floor space saved.

Our Bulletins Nos. 201 and 202 describing these refinements are yours on request.

DWYER EQUIPMENT CO.

4534 W. NORTH AVE. CHICAGO, ILL.

HEAT WITH WINFAN UNIT HEATERS



The Shivering Building makes no man welcome

ANOTHER YEAR—another loss! . . . Losses due not alone to excessive fuel costs, but vacant offices, increased tenant turnover and maintenance costs. Something must be done about it . . . . And then something was done about it! . . . The faulty, obsolete hot water system was converted to a Webster Vacuum System of Steam Heating . . . The building was thawed out—filled up and kept filled—and the fuel bill showed a saving of $563.50 per year!

We asked an organization of independent engineers to develop a complete analysis of the installation in this and other buildings. Building managers and owners will be interested in examining the resulting data. The coupon is for your convenience.

- since 1888

Webster Systems of Steam Heating

Warren Webster & Company, Camden, New Jersey
Pioneers of the Vacuum System of Steam Heating
52 U. S. Branch Offices—*In Canada, Darling Bros., Ltd., Montreal*

More than 46,000 installations in America's finer buildings

WARREN WEBSTER & COMPANY, Camden, New Jersey
We would like to read about the money saved by "Modernization" of Obsolete Heating Plants.

Name..... Title.....

Address .....

HVM-5-28

ANOTHER EXAMPLE!

Was 50% unoccupied—Webster Heating Brings Them Back

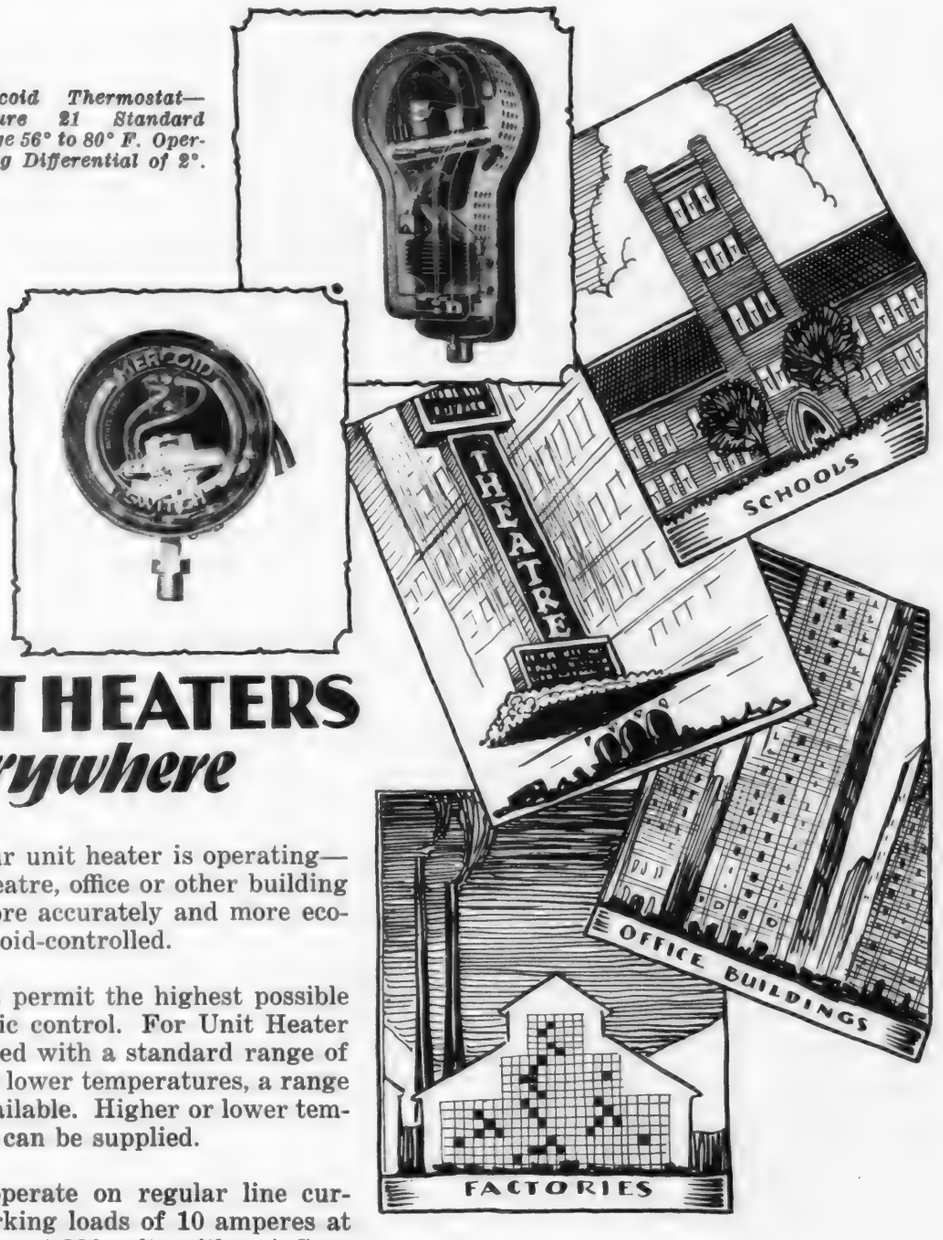
Up to 1925 unoccupied cold rooms were costing a Y. M. C. A. over $4,500.00 a year. The Board of Directors determined to correct the condition by replacing the hot water system then in use. After a thorough investigation to find what system would give the desired result with the least investment, a Webster Vacuum System of Steam Heating was decided upon.

After two years of operation we asked a firm of disinterested engineers to make a survey of this installation and report conditions as they found them. Here are the facts and figures:

Former cost of heating, $2,246.00 per year. Annual loss from 50 per cent of room rentals for seven months, $4,610.65. Total direct and indirect costs, $6,856.65.

With the Webster System heating all rooms to a comfortable temperature throughout the year, the deficit due to vacancy ceases to exist. And over and above the cost of operation, maintenance and carrying charges their records show an annual savings of more than $3,250.00—a sum that retires the cost of this modern installation in five years!

This report is typical of the conditions encountered and remedied by Webster Steam Heating Specialists in buildings of every size and type. If there is any doubt regarding the efficiency of the system now heating your plant or building write us for a data blank from which we will make a preliminary survey without obligation.



Mercoid Thermostat—Figure 21 Standard range 56° to 80° F. Operating Differential of 2°.

Mercoid Pressure Control — Figure 31. For dual Control.

for UNIT HEATERS *Everywhere*

No matter where your unit heater is operating—in factory, school, theatre, office or other building—it will function more accurately and more economically if it's Mercoid-controlled.

Mercoid Thermostats permit the highest possible efficiency of automatic control. For Unit Heater use, they are furnished with a standard range of 56° to 80° F. and, for lower temperatures, a range of 38° to 60° F. is available. Higher or lower temperature ranges also can be supplied.

These instruments operate on regular line currents for normal working loads of 10 amperes at 110 volts, or 5 amperes at 220 volts, either A.C. or D.C. As a pilot switch, where used in series with the proper starting switch, the Mercoid will automatically control motors of the largest size. No transformers are required for voltages up to 220.

Write for complete information on Mercoid Controls for Unit Heaters

THE MERCOID CORPORATION

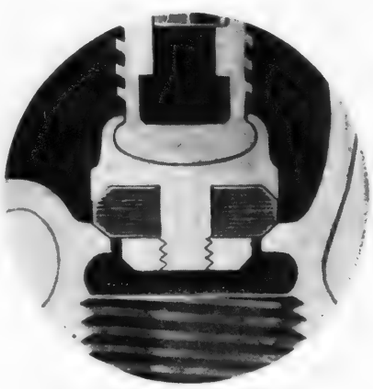
564 W. Adams St.,
CHICAGO, ILL.

25 Church St.,
NEW YORK, N. Y.

MERCOID
System of
DIRECT CONTROL

Marsh Cone Discs are without question the **greatest improvement** in radiator valve construction **in the past fifty years** or since the composition disc replacing the old style metal-to-metal disc and seat; **are original, distinctive and exclusive** with the **Marsh Valve Company,** of Dunkirk, New York, and are offered to the trade **only** and exclusively through its Sales Organization and Distributors.

¾" Full Size



Positive Seal

We call particular attention to the following FIVE POINTS OF ADVANTAGE of this construction over the old style flat disc and seat:

FIRST—Through design of disc and protection afforded from disc nut covering under surface they will not warp and crack as will a flat disc which overhangs valve seat.

SECOND—The compression is at right angles to face of seat, forcing disc compound inward to center, making disc more compact and harder instead of scoring and extruding over seat, opening cracks or seams if any, as with a flat disc.

THIRD—While the life of these cone discs because of construction, as proven by test, is three to five times the life of a flat disc, and a CRACKED DISC IS IMPOSSIBLE, the matter of exchange if desired is very simple, as to remove disc nut the disc will drop from dischold er, while with a flat disc it must be dug out, often destroying dischold er. Further, these cone discs are reversible and can be turned over or replaced with new at the same cost as for a flat disc.

FOURTH—The beveled seat is low in valve body, giving perfect drainage and will wash free from sand or scale in system, positively providing against leakage through scale or grit imbedding in disc AS IS COMMON with a raised flat seat and flat disc construction.

FIFTH—Through this low beveled seat, to return condensation through valve for a one-pipe system, the flow will hold to the outer wall, leaving center of valve throat and pipe free rather than shoot out over a raised seat to the center of pipe as is common with a heavy flow over a flat seat, clogging flow of steam, causing hammer or pounding of system.

The above are all, each and every one, practical points which will prove out in test and practice.

WE SPECIALIZE on high grade radiator valves, THEREFORE QUALITY; and manufacture and furnish the largest line of any company in the world, THEREFORE QUANTITY AT MINIMUM COST, and—QUALITY and COST—talk.

Get Our Catalog and Prices

MARSH VALVE COMPANY

DUNKIRK **NEW YORK**

General Sale Distributors

Edward T. Hetherington
1709 Sansom St., Philadelphia

Appleton & Liptrott, Inc.
1480 Broadway, New York

John W. Mabbs
431 So. Dearborn St., Chicago, Ill.

United States Radiator Corp'n
General Offices: Detroit, Mich.

Jas. P. Marsh & Company
118 So. Clinton St., Chicago, Ill.

SARCO COMPANY, Inc.
183 Madison Ave., New York

Taylor-Forbes Company
Canadian Agents Guelph, Ont.

What "ARMSTRONG" means

IN steam trap operation it means just one thing. It means that there is only one way to build a steam trap so that it performs all steam trap duties efficiently without the need of attention for a long period of time.

The inverted submerged bucket construction of Armstrong Traps [which is patented] gives them a combination of characteristics which is unique in steam trap performance. Study the following points carefully.

1 Water sealed—no steam can escape.
2 Non air-binding—discharges all air.
3 Self-scrubbing—sediment and scum are discharged with the condensate.
4 Positive in action—valves are either wide open or tightly closed—no wire drawing.
5 Small size with large capacity—low cost, simple installation and neat looking job.
6 Sturdy and simple construction—long life, negligible maintenance and trouble-free operation.
7 Maximum economy—no loss of live steam, increases operating efficiency and protects equipment.

Every detail has been carefully worked out and thoroughly tested. Nothing has been spared to make the Armstrong Trap as nearly perfect as possible.

So that you may convince yourself of Armstrong advantages we will gladly send you a trap for test purposes without expense, and you may keep it 3 months.

ARMSTRONG MACHINE WORKS
346 Maple Street
Three Rivers, Michigan
District Representatives in 36 Cities

Sign and mail this coupon. It will bring our catalog and name of nearest dealer.

Name .....
Firm .....
Street Address .....
City and State .....

H&V5-Gray

100% Automatic Control

9 MUELLER points that build satisfaction

1 **No expansion tank, either open or closed.**

2 **No more expensive than expansion tank system, and installed much more quickly.**

3 **Water in system always fresh.**

4 **Rate of circulation is increased, due to pressure and fresh water.**

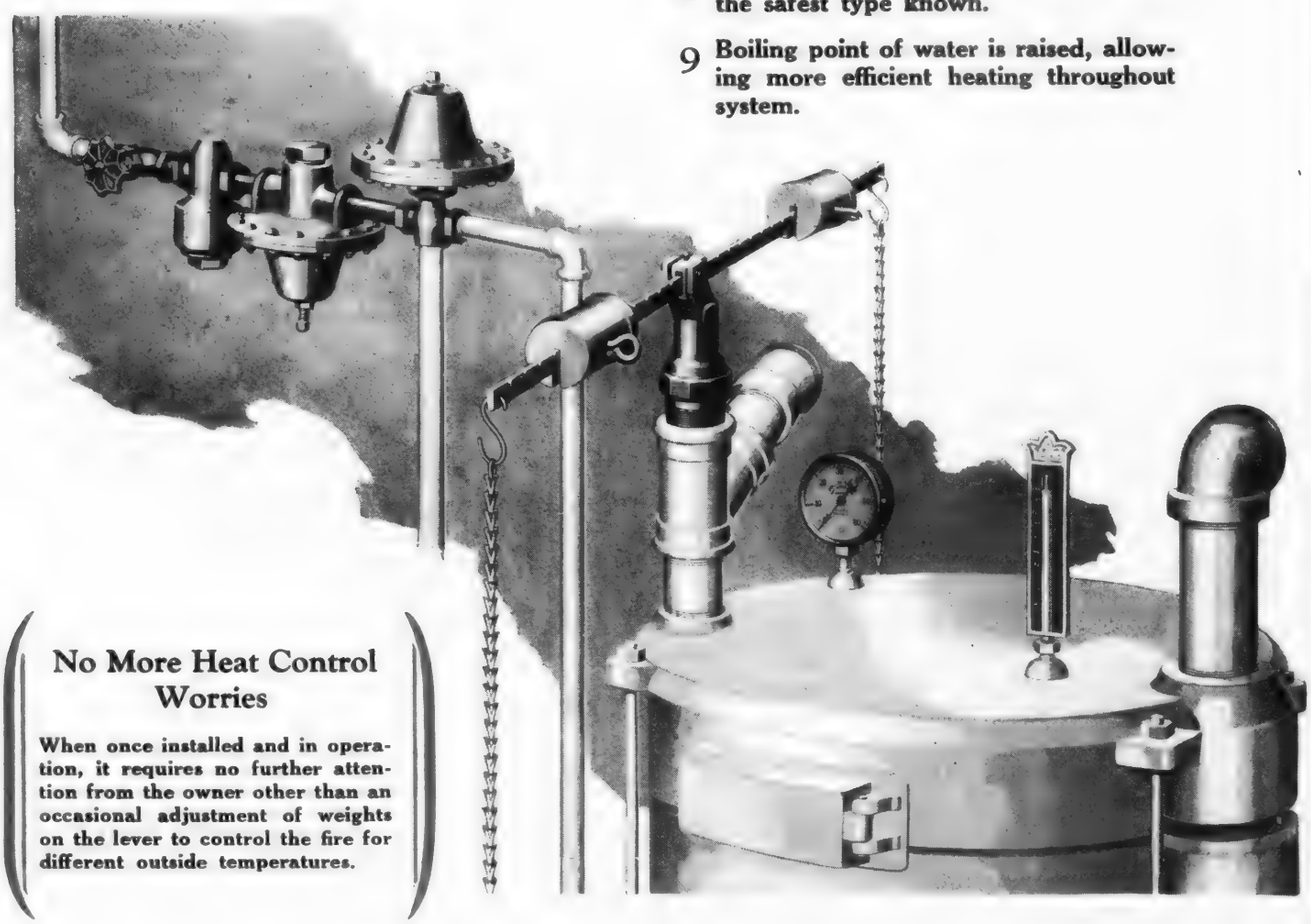
5 **Entirely automatic as to supply, relief and damper regulation. Requires only minimum attention.**

6 **A very considerable saving in fuel through automatic damper control and more rapid circulation.**

7 **Perfectly safe. Relief valve and regulating valve are operated positively by pressure of water in system.**

8 **Valves are positive in action and are the safest type known.**

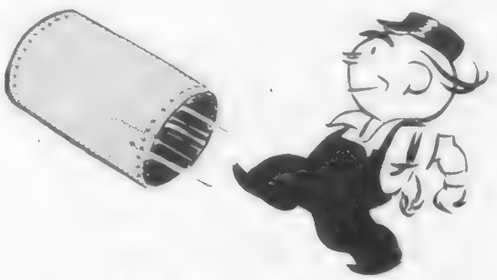
9 **Boiling point of water is raised, allowing more efficient heating throughout system.**



No More Heat Control Worries

When once installed and in operation, it requires no further attention from the owner other than an occasional adjustment of weights on the lever to control the fire for different outside temperatures.

for Hot Water Heat



Kick out the old expansion tank!

A great step forward in heating

The home is made more livable; home owners are satisfied—that's why architects and builders turn to the heating contractor who can supply the Mueller Heating System.

Complete, automatic control of water supply, pressure relief and dampers, enables the hot water plant to give dependable, uniform heat in every room. It saves a considerable amount of fuel through the season and provides better and more rapid circulation.

The actual cost to the owner is no greater than the old-fashioned expansion tank that caused damage and needed constant attention. The installation of the Mueller Heat Control System requires *less* labor than an expansion tank installation.

Because they find the Mueller Heating System makes friends and dollars for them, an increasing number of heating contractors are deciding to *kick out the old expansion tank!*

MUELLER OF DECATUR

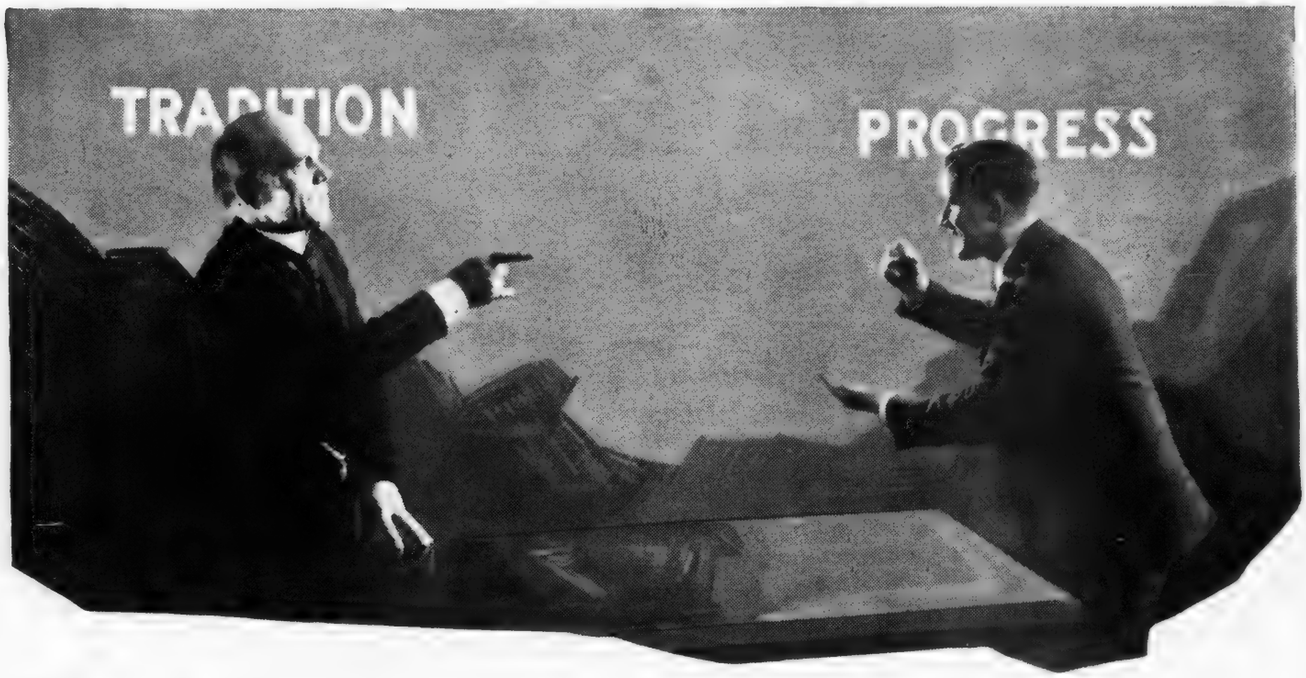
Established 1857 Decatur, Illinois

Branches: New York, Dallas, San Francisco, Los Angeles.
Canadian Factory: MUELLER, Limited, Sarnia.

MUELLER

Automatic Heat Control System

Pop stands on his privilege



"Here, Lad—

I don't care what you say about nearly all the factories around here adopting 'Linc-Weld' motors. That's their privilege. It's my privilege to stick to a motor maker who doesn't change to modern doodads and I stand up for his rights."

"No, Pop—

you mean that you stand up for his WRONGS.

You STAND for a motor with spindly shafts, yet you SIT on 'Linc-Weld' for stepping out from traditional custom and making double size shafts and bearings for the specific purpose of obviating stand-ups in production.

You STAND for application of light built motors (that can't carry any overload) to a good machine, thereby limiting its production . . . while 'Linc-Weld's' whole reputation is built on overload capacity and cool operation on heavy drags.

But since you stand for them, I know the reason.

You've been kicked around by the makers so long—and I've kicked about them so often—and the machine operators have kicked to you so often—

—that you can't do anything BUT stand."

The Lincoln Electric Co., Dept. No. 16-5, Cleveland, Ohio

M-14

"Linc-Weld"

LINCOLN MOTOR

TAMING THE GIANT STEAM

STEAM is a giant of tremendous power. For more than a century it has been harnessed to drive the world's steamships and railway trains, and to supply power for the world's industries.

Fifty years ago, when steam was first used for heating, the giant knew no leash. He was permitted to hold noisy dominion over the entire heating system, where he clanked and rattled to his heart's content, because steam pressures in the old-fashioned heating systems of the seventies were usually maintained at high levels, regardless of outdoor temperatures. Often these high steam pressures were the only means by which the steam could be forced through the piping and into the radiators against the accumulated air and water they contained.

Thus the Giant Steam knew no master in the heating field until a quarter century ago, when the invention of the Dunham Thermostatic Radiator Trap effectively controlled his force and subdued his strident voice. This remarkable invention, a typical Dunham development, made possible the Vacuum Return Line System using pressures in the steam main and vacuums in the return mains. Then followed other important Dunham contributions to heating, such as the Dunham Vapor Heating System, using steam at tea-kettle pressure, and the Dunham Return Trap System.

These developments, all pioneered by Dunham Engineers, were worthy forerunners of the present day Dunham Differential Vacuum Heating System, which, in this Dawn of a New Era in steam heating, has not only fully tamed the Giant Steam through its successful application of Sub-Atmospheric Steam to heating, but, of even greater importance, has removed the great fuel waste which had accompanied its use.

By making use of steam produced at pressures below atmosphere, and at temperatures to correspond with these pressures down to as low as 133 degrees, the Dunham Differential Vacuum Heating System does away with the need for wasteful window opening. In a building heated with Sub-Atmospheric Steam you will not find windows flung open to permit the surplus heat to escape, for indoor temperatures are effectively controlled so as to eliminate this waste of fuel. And in addition to this fuel saving, Sub-Atmospheric Steam insures better health among building occupants, because the indoor air is neither overheated nor dried out by excessive temperatures. *Only in the Dunham Differential Vacuum Heating System are these vital advantages obtainable.*

The DUNHAM
Difr~enshal~Vacm
Heating System.
A FIXED DIFFERENTIAL IN PRESSURE — A VARIABLE DEGREE OF VACUUM

U. S. Patent No. 1644114. Additional patents in the United States, Canada and Foreign Countries now pending.

Over eighty branch and local sales offices in the United States and Canada and the United Kingdom bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will counsel with you an any project.

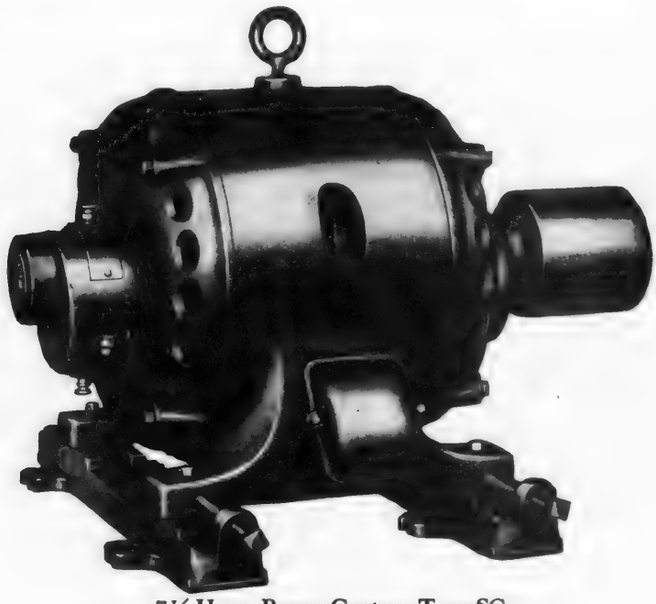
Look for the Name
DUNHAM
This nameplate identifies a genuine DUNHAM Radiator Trap

C. A. DUNHAM CO.

DUNHAM BUILDING

450 East Ohio Street, Chicago

HEATING



7½ Horse Power Century Type SC
Squirrel Cage Induction 3 and 2 Phase Motor

Service

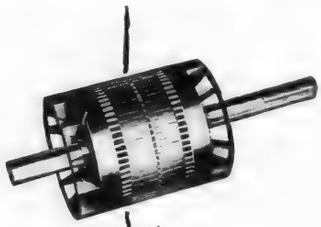
Continuous..Dependable..Uninterrupted

Year after year, Century Type SC Squirrel Cage Induction 3 and 2 Phase Motors "Keep a-Running". They are the result of more than 24 years of knowing how to build motors for continuous, dependable service.

They are liberally proportioned, with proper mechanical and electrical design and correct allocation of active materials, so that no one characteristic is over developed at the expense of another .... Bearings last. They are machined from phosphor bronze castings, the best bearing material obtainable .... Ball or roller bearings can also be supplied.... Armatures are commercially indestructible .... Conductor bars are solidly brazed to channel section end rings over an area equal to about six times the cross section area of the bars .... Field coils withstand dampness, even in humid, tropical climates, because they are thoroughly insulated, and are then saturated with insulating varnish. This preserves the insulation and protects the windings .... Dampness does not affect them.

Built in standard sizes from ¼ to 75 horse power

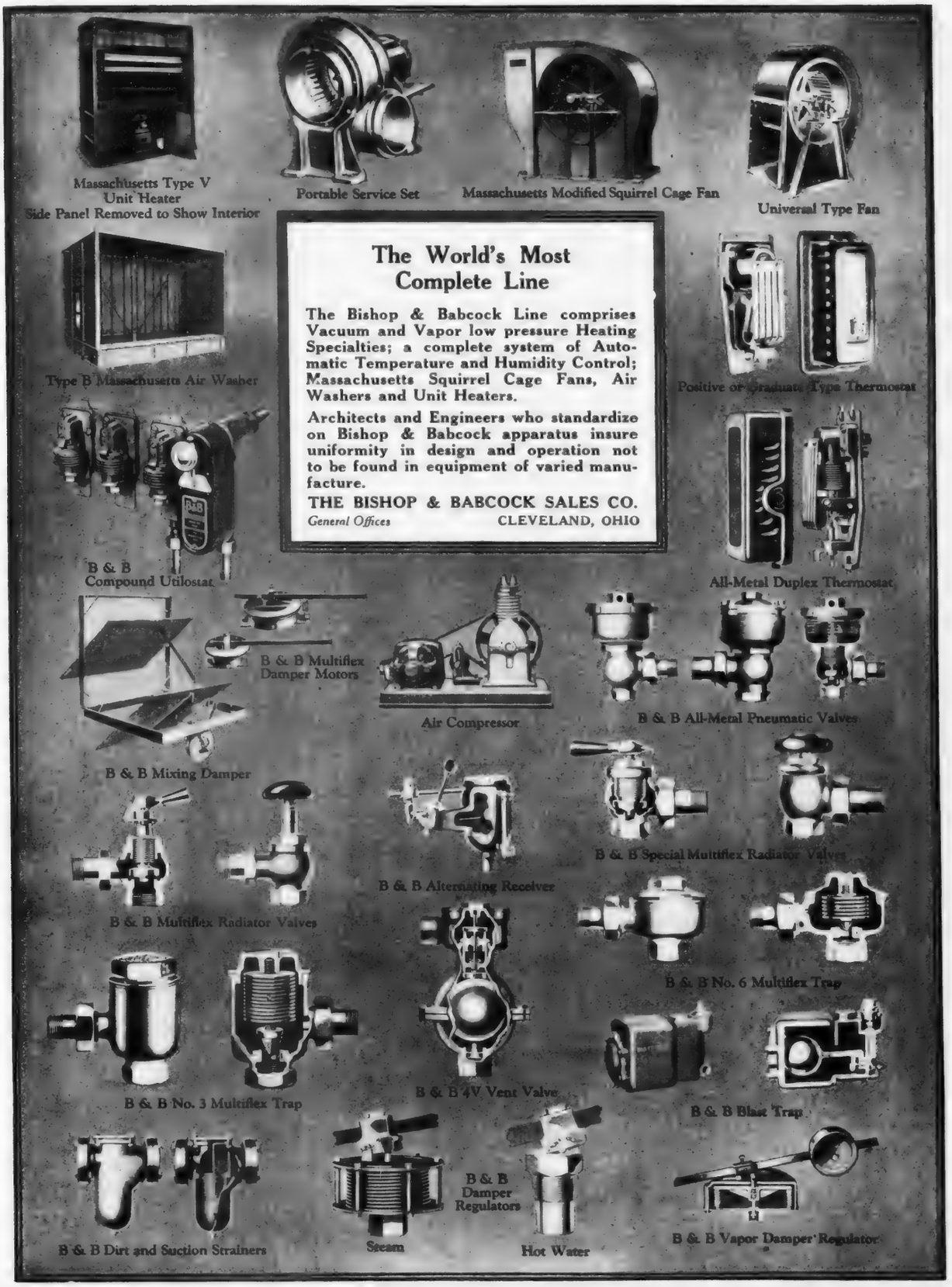
The armatures of Century Type SC Squirrel Cage Induction 3 and 2 Phase Motors are practically indestructible. They possess the most desirable electrical characteristics.



CENTURY ELECTRIC COMPANY
1806 Pine St. St. Louis, Mo.
33 Stock Points in the United States and more than 50 outside thereof

Century MOTORS

"THEY KEEP A-RUNNING"


Massachusetts Type V Unit Heater Side Panel Removed to Show Interior
Portable Service Set
Massachusetts Modified Squirrel Cage Fan
Universal Type Fan
The World's Most Complete Line
The Bishop & Babcock Line comprises Vacuum and Vapor low pressure Heating Specialties; a complete system of Automatic Temperature and Humidity Control; Massachusetts Squirrel Cage Fans, Air Washers and Unit Heaters.
Architects and Engineers who standardize on Bishop & Babcock apparatus insure uniformity in design and operation not to be found in equipment of varied manufacture.
THE BISHOP & BABCOCK SALES CO.
General Offices CLEVELAND, OHIO
Type B Massachusetts Air Washer
Positive or Graduate Type Thermostat
B & B Compound Utilostat
All-Metal Duplex Thermostat
B & B Multiflex Damper Motors
Air Compressor
B & B All-Metal Pneumatic Valves
B & B Mixing Damper
B & B Special Multiflex Radiator Valves
B & B Alternating Receiver
B & B Multiflex Radiator Valves
B & B No. 6 Multiflex Trap
B & B No. 3 Multiflex Trap
B & B 4V Vent Valve
B & B Blast Trap
B & B Damper Regulators
B & B Dirt and Suction Strainers
Steam
Hot Water
B & B Vapor Damper Regulator

BISHOP & BABCOCK

TEMPERATURE REGULATION

HEATING SPECIALTIES VENTILATING EQUIPMENT

A few Athey Weatherstripped Buildings that enjoy comfortable tenants and low coal bills

What is the heating cost per cu. ft. in your Building?

The Most Weather-exposed building in Chicago, the windy city

Notice how completely ATHEY Weatherstrips seal the window against drafts, dust, and smoke by the cloth-to-metal contact—the most thorough method devised that makes windows weather-tight without making them hard to open and close.

THE office building at the right is probably the most weather-exposed building in Chicago. The broad expanse of northwest frontage, with no protection on any side, allows the full sweep of cold winds from any direction.

Yet—the cost of heating is less than 4/10 of a cent per cubic foot. Compare this with some of the most modern structures recently built. Unless they are *Athey Weatherstripped*, even though they are protected on the north and west by other buildings, engineers' reports show that fuel costs are from 25% to 100% greater.

The London Guarantee & Accident Bldg., has 2,887,500 cu. ft. of space. The engineers report a heating cost of .0036 per cu. ft.

Another Modern Chicago office building showed a saving, when *Atheyized*, of 572 tons of coal the first year. The Reason is—Athey Weatherstrips have *cloth-to-metal contact. It pays to "Atheyize."* Interesting Catalog on request.

London Guarantee & Accident Bldg., Chicago, Ill.

ATHEY COMPANY

6057 W. 65th St., CHICAGO

Detroit:
W. O. LeSage & Co.
410 Donovan Bldg.

Montreal, Que.
Cresswell-McIntosh, Reg'd
420 Seigneurs St.

Athey

CLOTH-LINED
WEATHERSTRIPS
and
PERENNIAL WINDOW SHADES

City of Onalaska, Washington. J. W. Luke, Portland, Oregon; *Consulting Engineer*

Heating the whole town *from one central power plant!*

Minimizes fire risk, eliminates firing of boilers and stoves, and affords a remarkable fuel economy

Miles of steam mains, operating with positive circulation and maximum economy, from one central power plant, heat entirely the Carlisle Lumber Company's model city of Onalaska, Washington, comprising office buildings, churches, schools, stores, and hundreds of residences.

These successful results are possible because all Valves, Thermo Radiator Traps, Steam Traps, Reducing Valves, Back Pressure Valves, etc., are of one manufacture —ILLINOIS ENGINEERING COMPANY—giving unified operation and undivided responsibility.

SEE OUR CATALOGUE IN SWEETS

Consult us on your central heating problems!

***General Offices and Factory:* 21st and Racine Ave., Chicago**

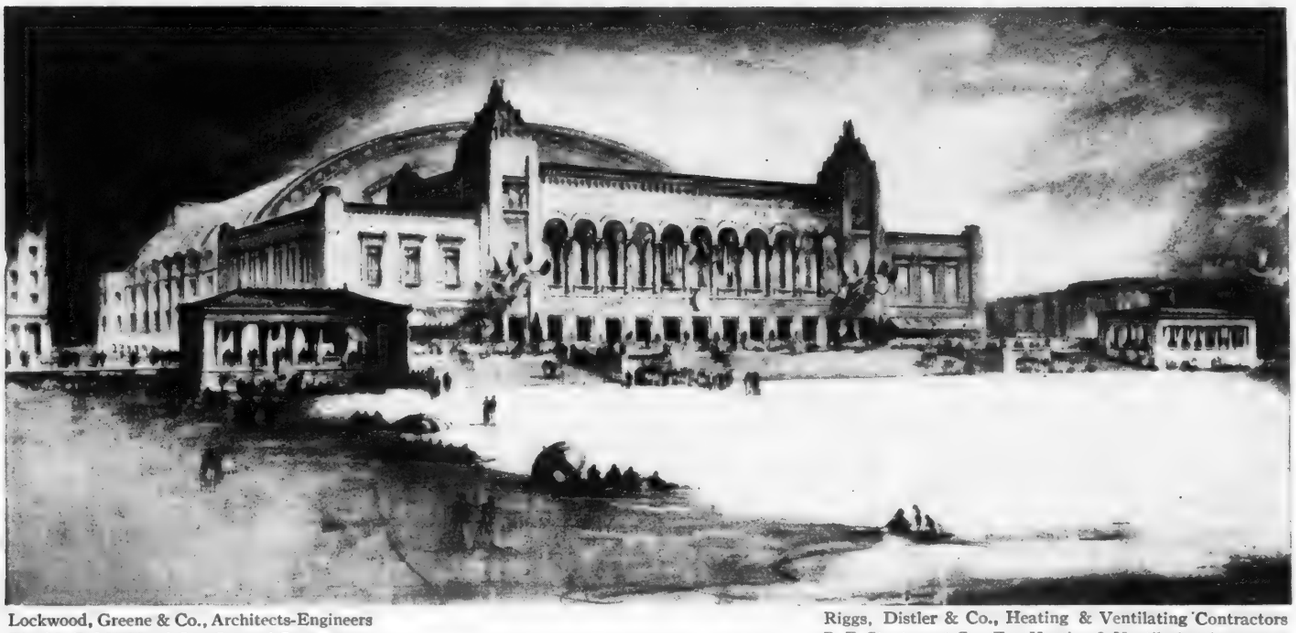
Portland Office: J. W. LUKE *Seattle Office:* W. A. HILL

REPRESENTATIVES IN 40 CITIES OF U.S.A.

ILLINOIS ENGINEERING COMPANY

ROBT. L. GIFFORD President INCORPORATED 1900

CHICAGO



Lockwood, Greene & Co., Architects-Engineers
The M. B. Markland Co., General Contractors

Riggs, Distler & Co., Heating & Ventilating Contractors
B. F. Sturtevant Co., Fan Heating & Ventilating Apparatus
Photo Wurts Bros.

The World's Play Ground the Year around Atlantic City

The magnificent new Convention Hall is heated by

AEROFIN

The modern non-corrosive Fan System Heating Surface

Truly,---as did the brilliant Engineers who conceived and executed this gigantic structure,---

"Whatever you've wished for in a Fan System Heating Surface you'll find in Aerofin"

In the new Atlantic City Convention Hall 41,234 sq. ft. of Aerofin, weighing less than 50,000 lbs., will heat nearly a million cu. ft. of air per minute!

Aerofin is made in two types;—Low Pressure Aerofin for pressures up to 50 lbs. gauge, and High Pressure Aerofin for pressures up to 350 lbs. gauge. Both types are completely encased in sturdy galvanized steel, ready for pipe and duct connections. Complete information, with valuable technical data, covering either Low or High Pressure Aerofin, or both, will be mailed upon request.

AEROFIN CORPORATION

Burnham Building
CHICAGO

750 Frelinghuysen Avenue, NEWARK, N. J.
39 Cortlandt Street, NEW YORK

Oliver Building
PITTSBURGH

LOW PRESSURE
AEROFIN
For pressures up to 50 lbs.
Tube-plate Construction

Aerofin is sold only by Manufacturers of nationally advertised Fan Heating Apparatus

HIGH PRESSURE
AEROFIN
For pressures from 25 to 350 lbs.
Continuous Seamless Tubes

WHY SHOP around when you can buy ALL you need in heating systems and specialties and get ONE guarantee from ONE manufacturer?

Today, the Milwaukee Valve Company, backed by 27 years of specialization in the heating field, is fully organized and equipped to render this unusual service to the heating industry.

In addition to making equipment for every size and type of heating installation the line also includes an unexcelled variety of "Milwaukee" standard brass valves, packed type radiator valves, gate, globe, angle, check valves, etc.

Get the habit of specifying and installing MILVACO *exclusively.*

Write for complete information, Dept. B

MILWAUKEE VALVE COMPANY

Manufacturers of

[Steam or Hot Water] COMPLETE HEATING SYSTEMS [Vacuum or Vapor]

Milwaukee, Wisconsin

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The Heating and Ventilating Magazine

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Contents for May, 1928

Dynamic Significance of Static Pressure.....*Dr. George De Bothezat* 65
A Vivid Word-Picture Defining Terms and Explaining Phenomena Fundamental in Ventilation.

New Radiation Tables.....*Paul R. Babcock* 68

The Status of District Heating.....*F. G. Austin* 76
Part III—Rochester Gas & Electric Corporation's Extension of Heating Service to the Genesee Hospital.

Heating and Ventilation Specifications.....*Harold L. Alt* 80
Part III—Their Composition to Suit the Conditions of Practical Work.

"The Next Size Larger".....*J. Blansjaar* 82
II—European Practice in Low-Pressure Steam Heating.

American Oil Burner Association..... 85
Proceedings of the Fifth Annual Convention.
Exhibits at the Convention.

New Oil-Burner Listings by Underwriters..... 93

An Unusual Scheme for Garage Ventilation.....*S. C. Wilson* 93

Illinois Master Plumbers' Association Formulates Radiation Factors for Insulated Buildings..... 94

How Would You Do It?..... 98

The B. T. U. Club..... 99
Automobile Parking Scheme That Simplifies Ventilation Problem.
Why 240?

New York Apartment Operates All Utilities with Gas..... 101

The Weather for March, 1928..... 102
New York, Boston, Pittsburgh, Chicago, St. Louis.

Monthly Heating Loads in Degree-Days In Five Typical Cities..... 104

Purdue University Initiates Huge Research Program..... 104

Correspondence..... 105
The Boston School System.
Use of Fans to Increase Effectiveness of Radiators.

American Society of Heating and Ventilating Engineers..... 106
Plans for Semi-Annual Meeting.
Council Meets and Chooses Chicago for Next Annual Meeting.
Boiler Rating Committee Meets in Pittsburgh.
Chapter Notes.

Heating and Piping Contractors National Association..... 108
Plans for 39th Annual Convention.
Cleveland Heating Men on Inspection Trip.
Certified Heating Campaign to Be Repeated.
Chapter Notes.

Plumbing and Heating Industries Bureau..... 110
Intensive Campaign for New Business in Philadelphia
Inauguration of Rehabilitation Campaign.
Philadelphia Sales Campaign.
Bureau Establishes Pacific Coast Branch.

Present Practice in Vapor Heating..... 111
14. The Hutchison System.

Home-Modernizing Bureau of the National Building Industries Organized..... 113

Revised Uniform Mechanics' Lien Act..... 115

Standard Heating and Ventilating Data Sheets..... 98A
No. 13K3—Radiation Computing—H. & P. C. N. A. Standard Radiation Estimating Table for Chicago, Ill. (Revised).
No. 13L3—Radiation Computing—H. & P. C. N. A. Standard Radiation Estimating Table for Norfolk, Va.

Engineers' Specification Index, Page 178.
Advertisers' Index, Page 186.

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The "Why" of a Technical Journal

NO matter how busy folks are, they are never too busy to talk shop. Perhaps this is a little hint as to why the business paper continues of absorbing interest to the business man. It talks his language; it talks about his business and the business of his customers and his competitors. Notwithstanding its concentrated controlled circulation strictly within the confines of some particular industry, yet its readers, comparatively small numerically, nevertheless represent a large percentage of the purchasing power of the ultimate consumers in that industry.

More and more the business paper is becoming a specialist. More and more business paper publishers are finding out that they cannot successfully combine a little of this, a little of that, and a little of everything else and cover any one of their subjects adequately and helpfully.

The foregoing is paraphrased from an editorial by Roger W. Allen, in *Advertising Club News*. In concise language it expresses the secret of the business paper's prestige in the commercial life of the nation.

G. V. Almquist

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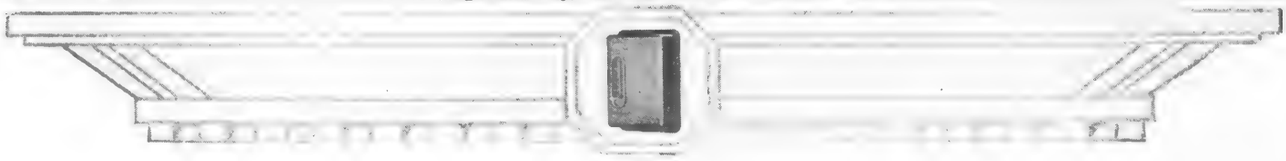


The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

MAY, 1928

Dynamic Significance of Static Pressure

A Vivid Word-Picture Defining Terms and Explaining Phenomena Fundamental in Ventilation

By Dr. George De Bothezat

Dr. George De Bothezat

WHAT is called static pressure* in ventilation phenomena rather should simply be called *pressure*, because static pressure does mean the *state* of pressure under which the air may be found, counted positive when above atmospheric pressure and negative when below.

The reason why the term static pressure prevailed in the technique of ventilation was the desire to avoid confusion with the so-called *velocity pressure*, which, roughly speaking, is proportional to the pressure one feels on the hand when it is held in a stream of air moving with a certain translational velocity. But the proper technical term for velocity pressure is *velocity head*, and if the correct term of velocity head always was used—which unhappily is not the case in practice—the appellation of static pressure would be unnecessary and *pressure* would be quite sufficient to convey the correct idea of what is meant, without any possible misinterpretation.

Having cleared up this point of terminology I will, in the following, generally use the more exact technical terms of *pressure* for static pressure and *velocity head* for velocity pressure.

For a very wide range of ventilating phenomena (where large temperature differences do not come into consideration), as well as for almost the whole of aerodynamical phenomena of modern aviation, one can neglect the variations of the air *density*, and consider the air, as far as its density is concerned, as an incompressible fluid. This assumption, although startling at first sight, is due to the fact that the variation of air density, in the cases just mentioned, is actually very small. Thus the variation of density does not reach 1% until the flow velocity equals 150 ft. per sec. (or 9000 ft. per min.)—a velocity very seldom met in ventilation—or until the pressure (static pressure) equals 5 in. of water column. Practically one can go to much higher flow velocities and air pressures without having to take into account the variation of air density and still stay within the range of accuracy of all aerodynamical measurements and observations which under the best conditions seldom reaches 5%.

Thus in all that will follow we will consider an average value of the air density δ equal to:

$$\delta \cong 0.00238 \text{ of a slug}$$

the units used being the pound (lb.) for the unit of weight, the second (sec.) for the unit of time and the foot (ft.) for the unit of length.

Let me recall to you that the *slug* is the appropriate name of the unit of mass in the British system of units, when the above mentioned fundamental units of weight, time and length are used. One slug is the mass contained in a body having an approximate weight of 32.2 lbs. It is also understood that I am using the word pound in its engi-

*See article "What Is Static Pressure," by Dr. George De Bothezat, in The Heating and Ventilating Magazine, for December, 1927, Page 67.

neering sense of *the weight of a pound* although scientifically speaking *the pound* is the unit of *mass*, the *unit of weight* in the *pound-mass*, feet, second, system of units being called *the poundal*.

There is a tendency to avoid the use of the unit of mass to express values of density in hydraulic and ventilating engineering, and usually the density is represented by the specific weight s (weight of a unit of volume, quite different from density which is the mass of a unit of volume) divided by the acceleration of gravity

$$g \cong 32.2 \text{ ft. sec.}^{-2}$$

Then everybody wonders why the density δ is always written

$$\delta = \frac{\text{specific weight}}{\text{gravity acceleration}} = \frac{s}{g}$$

or, for dry air under so-called normal barometric pressure and temperature, is written equal to:

$$\delta \cong \frac{0.077 \text{ lbs. ft.}^{-3}}{g \text{ ft. sec.}^{-2}}$$

This strange way of expressing density is only due to the fact that there is some kind of hesitation in using mass units for density. Apparently the concept of mass is still not sufficiently familiar to the engineering profession. But as almost *three hundred years* have elapsed since *Newton* established and showed the great importance of the *concept of mass* (and as we are using it in engineering anyhow, because it is impossible to do without it) it is time frankly to begin to use *masses expressed in mass units* and not disguise them as "weight divided by the gravity acceleration."

Density being a "mass per unit of volume" should be expressed in units of *mass* and, in the system of units of British engineering, this unit is the *slug*. The use of the proper unit for density brings with it much simplification and clarification in the whole question. Thus in the following we always will think of the air density δ as expressed in slugs and having the average value $\delta \cong 0.00238$ of a slug.

FLOW DESCRIPTION

Let us now consider a mass of air in a state of *steady motion* such that density variations in the mass can be neglected. Under such conditions the *stream lines* will actually be the paths followed by the air particles in their respective motions.

Let us take, in the fluid, a little cross-section (Fig. 1) and draw stream lines through every point of its boundary. We then will obtain what is called a *stream tube*. By the very definition of the stream tube no fluid flows through its walls. The whole flow phenomena will appear to us as the flow of the fluid inside a system of small pipes—into which we thus have imagined the whole flowing fluid mass to be divided.

When the stream lines *converge* in the direction of the flow—that is when the section of the stream tubes decreases in the direction of the flow—this means that the flow velocity is *increasing* in the direction of the flow, because the same mass of air needs less cross-section to pass through it at a higher velocity than at a lower velocity (Fig. 2, Case A). Vice versa, the stream lines *diverge* when the flow velocity *decreases* in the general direction of the flow (Fig. 2, Case B).

Before we proceed further it will be well to clarify in our minds the conception of pressure inside a moving fluid mass.

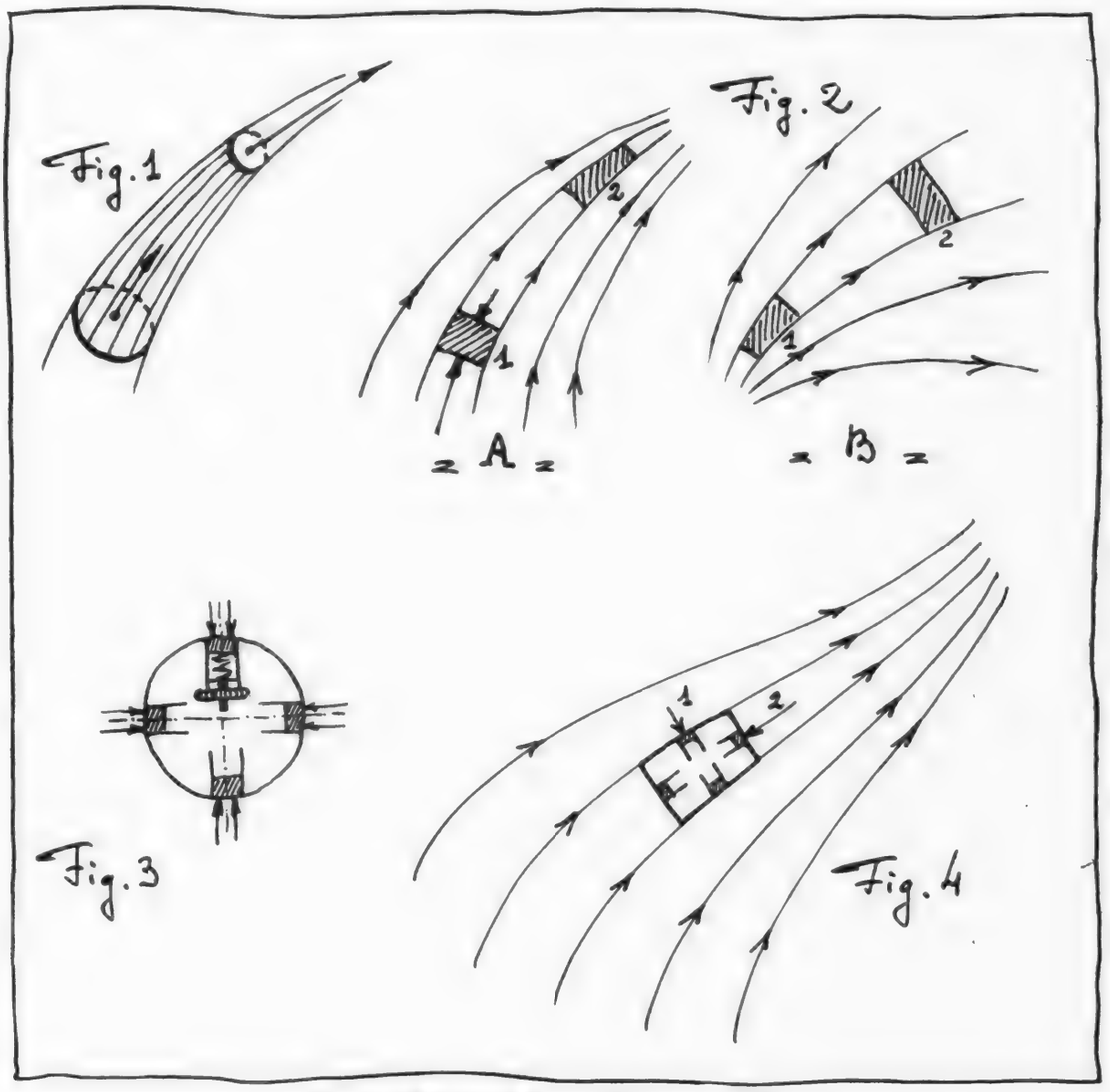
WHAT AN IMP CAN SHOW US

To reach to a physical feeling of what pressure is inside a fluid, let us imagine that we have at our disposal a little sphere, which we will call a *dynamometric sphere* and which is arranged in the following way. The dynamometric sphere is hollow and has a set of little pistons contained in small cylinders disposed all around the sphere just at its surface as shown in Fig. 3. A set of little springs holds these little pistons in place. The tension of these little springs can be regulated from behind by small nuts in such a way as to always have the little pistons just at the level of the surface of the sphere. Let us imagine inside our dynamometric sphere a clever little imp, very skilled in physical measurements. Let us also assume the dynamometric sphere to be very small, the areas of the little pistons, say, equal to only one one-hundredth of a square inch and the inside of the sphere, for the comfort of the rather human little imp, filled with air at the normal atmospheric pressure.

First, imagine our dynamometric sphere immersed in a fluid mass in equilibrium (that is not in motion) let us say inside our own atmosphere on a windless day. The outside pressure, when different from the normal pressure, will either push in or pull out the little pistons. The little imp, inside the sphere, by adjusting the little springs, will be able to get all the little pistons to stay exactly at the surface of the sphere. By reading the tensions of the springs, which may be compressed or expanded, the little imp will know how many pounds are acting on every little piston. By multiplying this number of pounds by one hundred (the area of each piston being one one-hundredth of a square inch), he will find the *pressure* in pounds per square inch on every little piston. It is this actual *positive* or *negative* pressure, from the outside, on the little pistons of our dynamometric sphere, that constitutes what is called the *pressure* inside a fluid mass in equilibrium.

If the dynamometric sphere is sufficiently small, the pressure on all the little pistons, however they are disposed on the surface of the sphere, will be the same. This last fact constitutes the fundamental characteristic of the pressure at a point inside a fluid mass, the magnitude of this pressure at any point being the same in any direction.

Consider now a fluid mass in steady motion, the flow being visualized by a system of stream lines. Imagine, for an instant, a small part of the fluid removed and replaced by a *dynamometric prism*,



Sketches Illustrating Internal Pressures in Fluids

similar in arrangement to the dynamometric sphere but prismatic in shape—of such shape that it would exactly replace the removed fluid (Fig. 4). Let us also imagine this dynamometric prism moving with the fluid mass in such a way as to leave the whole flow undisturbed.

The little imp inside the dynamometric prism will be able to record the pressure on the little pistons. Now *as the dynamometric prism is moving with the fluid*, the velocity of the fluid cannot affect the little pistons, and the little imp—who is nothing but our own thought—will be thus able to measure what actually constitutes the pressure at a point inside a moving fluid. This pressure is the actual pressure on the little pistons of the dynamometric prism, when the prism is moving with the fluid. If the dynamometric prism is small enough and *the viscosity of the fluid negligible*, the pressure on all the little pistons will be the same whatever their orientation. That is, the pressure in the direction 1 (Fig. 4) will be the same as in direction 2. At a point, inside a moving mass of fluid of *negligible viscosity* the pressure is the same in every direction, certainly only for an observer partaking of the motion of the fluid.

All the above explanations are nothing but a mental experiment which permits us to visualize very clearly what is meant by pressure at a point in a fluid mass either in equilibrium or in motion.

QUALITATIVE RELATION BETWEEN PRESSURE AND FLOW VELOCITY IN A STEADY STREAM

Let us now consider a fluid particle in Case A of Fig. 1, in its two successive positions marked 1 and 2.

By *fluid particle* we simply mean a small volume of fluid inclosed in a closed surface, which surface by definition is considered to be such that no fluid ever flows through it. When the particle is moving, this limiting closed surface changes its shape always in such a way that none of the fluid mass contained in the surface ever gets out. One will readily understand that this purely conventional conception of a fluid particle is created for the purpose of visualizing the motion of a small mass of fluid inside the whole mass so as to be better able to follow its behavior. Thus when the fluid particle 1, Fig. 2, passes from position 1 to 2, it changes

(Continued on Page 75)

New Radiation Tables

By Paul R. Babcock
Consulting Engineer

TO simplify heating calculations, the accompanying charts are presented giving the amount of radiation required to offset heat losses through various building materials. The charts are based on radiator efficiencies and apply not only to varying material or wall efficiencies but to different inside or room temperatures. It will be noted that charts cover outside temperatures of—15°, —10°, —5°, 0°, 5°, 10°, 15°, 20°, 25° and 30°. All charts are for one temperature of radiator, 215° F. and each for the constant outdoor or outside temperature.

The charts give "square feet of radiation to offset heat loss through 1 sq. ft. of material." They are based on varying radiator efficiencies, varying material or wall efficiencies, and varying inside or room temperatures.

After determining (1) the base outdoor temperature, (2) the type of radiator to be used and its coefficient, (3) the heat transmission through the enclosing walls, and (4) the temperature to be maintained in the room, the answer (for one square foot of wall) is read directly from the proper chart without recourse to troublesome conversion factors. The obnoxious "square feet of equivalent radiation" is avoided. After a little familiarity with the charts one can interpolate and be accurate to within 1% or 2%.

HOW TO USE CHARTS

As an example in the use of the charts: How many square feet of 2-col., 23-in. radiation is required to care for the heat loss through 300 sq. ft. of wall and glass when the transmission factor (U) for the wall is 0.5 B.T.U.? Of this 300 sq. ft., 75 sq. ft. is glass, whose transmission factor is 1.1 B.T.U., or 0.6 more than the wall in which it sets (1.1 — 0.5 = 0.6). The temperature to be maintained inside is 70° F. The coefficient for a 2-col., 23-in. radiator is 1.8 B.T.U. (This example can be followed through on Chart 1.)

The base number on the chart corresponding to 1.8 radiator coefficient and 0.5 wall transmission is 21. Start at the top of any of the charts where 21 intersects the 90° line and follow down and to the left, on the curved line, until the 70° inside temperature line is reached; then drop straight down to the bottom of the chart and read as follows:

(Let us work out the above problem for each of the outside temperatures covered by the charts and tabulate them below; thus we really are working ten problems.)

DETERMINING RADIATION TO OFFSET WALL LOSS

Outside Temperature Deg. F.	Sq. Ft. Radiation from Charts to Offset Heat Loss Through 1 Sq. Ft. of Material	Total Square Ft. Radiation for 300 Sq. Ft. Wall
—15	0.163	48.9
—10	.154	46.2
— 5	.144	43.2
0	.134	40.2
5	.124	37.2
10	.115	34.5
15	.105	31.5
20	.096	28.8
25	.086	25.8
30	.0765	23.0

Similarly, the base number for 1.8 radiator coefficient (K) and 0.6 glass factor (U) on the charts is 29, and the answers as picked from the charts, added to the previously-tabulated wall answers, give the following totals:

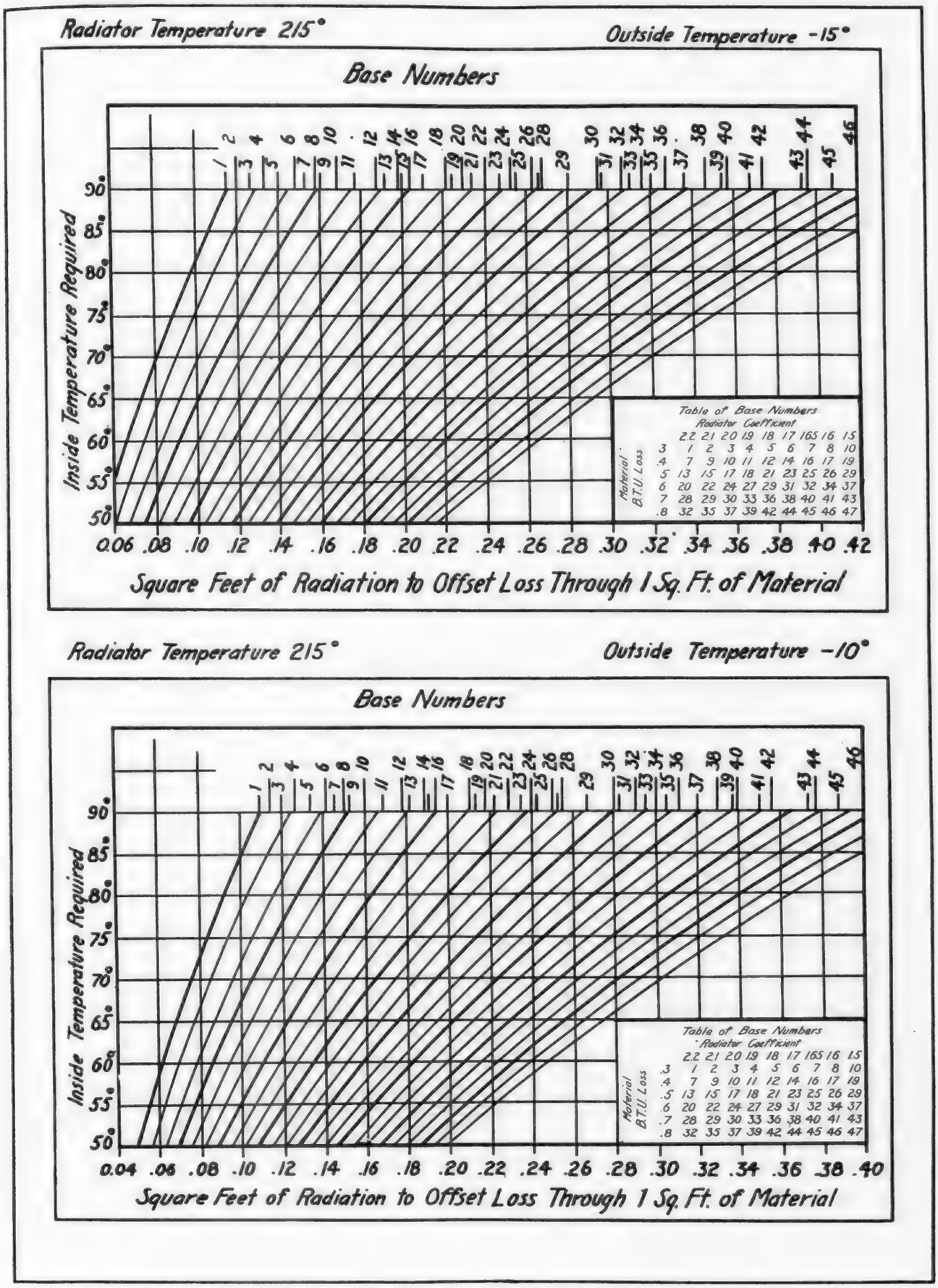
FINDING RADIATION NECESSARY FOR BOTH WALL AND GLASS LOSSES

Outside Temp. Deg. F.	Sq. Ft. Radiation for 1 Sq. Ft. Glass	Sq. Ft. Total Radiation for 75 Sq. Ft. of Glass	Sq. Ft. Radiation for 300 Sq. Ft. Wall	Total Sq. Ft. Radiation for Wall and Glass
—15	0.195	14.6	48.9	63.5
—10	.184	13.8	46.2	60.0
— 5	.172	12.9	43.2	56.1
0	.161	12.1	40.2	52.3
5	.150	11.2	37.2	48.4
10	.137	10.3	34.5	44.8
15	.126	9.5	31.5	41.0
20	.115	8.6	28.8	37.4
25	.103	7.7	25.8	33.5
30	.092	6.9	23.0	29.9

Let us tabulate the answers to another problem (giving them for each of the charts) as follows:

How many square feet of 29-in. high wall radiation is required to maintain 70° F. in a room which has 1000 sq. ft. of exposed wall and glass (the coefficient for the wall equalling 0.7 B.T.U.), and 500 sq. ft. of which is glass (with a coefficient of 1.1 B.T.U. or 0.4 B.T.U. more than the wall). The radiator coefficient is 2.0.

The base number for 2.0 radiator coefficient (K) and 0.7 wall is 30 and for 2.0 radiator coefficient (K) and 0.4 glass is 10. The tabulation will be as follows:



Charts for Determining Radiation Where Base Outside Temperatures Are — 15° and — 10°

SOLVING ANOTHER PROBLEM

Outside Temp. Deg. F.	Sq. Ft. Radiation for Wall from Charts (x1000)	Sq. Ft. Radiation for 1 Sq. Ft. Glass from Charts	Sq. Ft. Radiation for 500 Sq. Ft. Glass	Total Sq. Ft. Radiation for Wall and Glass
—15	225	0.129	64.5	289.5
—10	213	.122	61	274
— 5	200	.115	57.5	257.5
0	187	.108	54	241
5	175	.100	50	225
10	162	.093	46.5	208.5
15	150	.086	43	193
20	137	.079	39.5	176.5
25	125	.0715	35.7	160.7
30	112	.064	32	144

All these examples can be proved by the formula:

$$\frac{M \times U \times (T_i - T_o)}{R_k\ (T_r - T_i)} = \text{square feet of radiation.}$$

M = Square feet of exposed wall.
U = Wall transmission in B.T.U. per sq. ft. per degree difference per hour.
T_i = Temperature inside, deg. F.
T_o = Temperature outside, deg. F.
T_r = Temperature of radiator, deg. F.
R_k = Radiator coefficient in B.T.U. per sq. ft. per degree difference per hour.

Air infiltration or change, of course, is not covered by these charts.

COEFFICIENTS OF HEAT TRANSMISSION FOR 10 SECTION DIRECT RADIATORS

In B.T.U. per square foot per deg. F. difference per hour. Temperature of radiator 215° F.

Type of Radiator	Temperature of Room, Deg. F. 50	70	90
29-in wall	2.04	2.01	1.97
22-in. wall	2.06	2.03	1.99
14-in. wall	2.22	2.18	2.14
1-col. 38-in.	1.79	1.76	1.73
1-col. 32-in.	1.85	1.82	1.78
1-col. 26-in.	1.90	1.87	1.83
1-col. 23-in.	1.96	1.93	1.89
1-col. 20-in.	1.97	1.94	1.90
2-col. 38-in.	1.70	1.67	1.64
2-col. 32-in.	1.76	1.73	1.70
2-col. 26-in.	1.80	1.77	1.74
2-col. 23-in.	1.83	1.80	1.77
2-col. 20-in.	1.84	1.81	1.78
3-col. 38-in.	1.61	1.58	1.55
3-col. 32-in.	1.62	1.59	1.56
3-col. 26-in.	1.64	1.61	1.58
3-col. 22-in.	1.70	1.67	1.64
3-col. 18-in	1.77	1.74	1.71
4-col. 38-in.	1.47	1.45	1.42
4-col. 32-in.	1.54	1.52	1.49
4-col. 26-in.	1.61	1.58	1.55
4-col. 22-in.	1.66	1.63	1.60
4-col. 18-in.	1.73	1.70	1.67

For 5-section (or smaller) radiators, multiply these coefficients by 1.05.

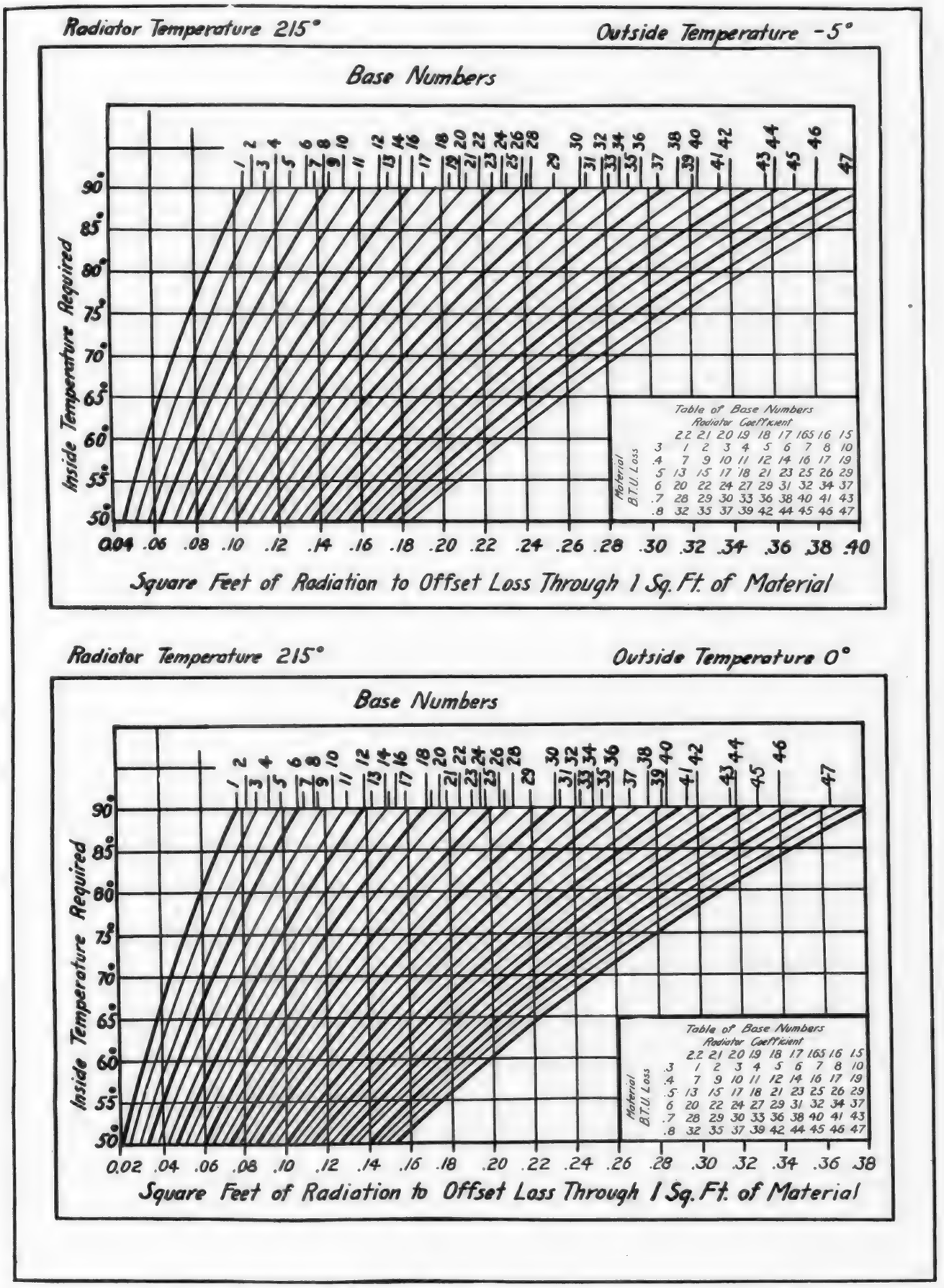
TABULATION OF CITIES ACCORDING TO BASE OUTDOOR TEMPERATURE

— 15° and over			
Fort Smith, Ark.		Havre, Mont.	— 57
Hartford, Conn.	— 18	Helena, Mont.	— 42
Denver, Colo.	— 29	Lincoln, Neb.	— 29
Pueblo, Colo.	— 27	Omaha, Neb.	— 32
Washington, D. C.		Valentine, Neb.	— 38
Boise, Idaho.	— 28	Reno, Nev.	— 19
Lewiston, Idaho.	— 23	Winnemucca, Nev.	— 28
Pocatello, Idaho.	— 20	Concord, N. H.	— 35
Cairo, Ill.	— 16	Albany, N. Y.	— 24
Chicago, Ill.	— 23	Binghamton, N. Y.	— 28
Springfield, Ill.	— 24	Canton, N. Y.	— 43
Indianapolis, Ind.	— 25	Ithaca, N. Y.	— 22
Evansville, Ind.	— 16	Oswego, N. Y.	— 22
Des Moines, Iowa.	— 30	Syracuse, N. Y.	— 22
Keokuk, Iowa.	— 27	Bismarck, N. D.	— 45
Sioux City, Iowa.	— 35	Williston, N. D.	— 49
Dubuque, Iowa.	— 32	Dayton, O.	— 28
Concordia, Kans.	— 25	Cincinnati, O.	— 17
Dodge City, Kans.	— 26	Cleveland, O.	— 17
Wichita, Kans.	— 22	Columbus, O.	— 20
Lexington, Ky.	— 20	Oklahoma City, Okla.	— 17
Louisville, Ky.	— 20	Baker City, Ore.	— 24
Portland, Me.	— 21	Erie, Pa.	— 16
Alpena, Mich.	— 27	Pittsburgh, Pa.	— 20
Detroit, Mich.	— 24	Scranton, Pa.	
Escanaba, Mich.	— 32	Huron, S. D.	— 43
Grand Rapids, Mich.	— 16	Rapid City, S. D.	— 34
Lansing, Mich.	— 26	Knoxville, Tenn.	— 16
Marquette, Mich.	— 27	Salt Lake City, Utah	— 20
Saginaw, Mich.	— 23	Burlington, Vt.	— 28
Duluth, Minn.	— 41	Northfield, Vt.	— 41
Minneapolis, Minn.	— 33	Spokane, Wash.	— 30
Moorhead, Minn.	— 48	Parkersburg, W. Va.	— 27
St. Paul, Minn.	— 41	La Crosse, Wis.	— 43
Hannibal, Mo.	— 25	Milwaukee, Wis.	— 25
Kansas City, Mo.	— 22	Cheyenne, Wyo.	— 38
St. Louis, Mo.	— 22	Lander, Wyo.	— 36
Springfield, Mo.	— 29	Sheridan, Wyo.	— 34

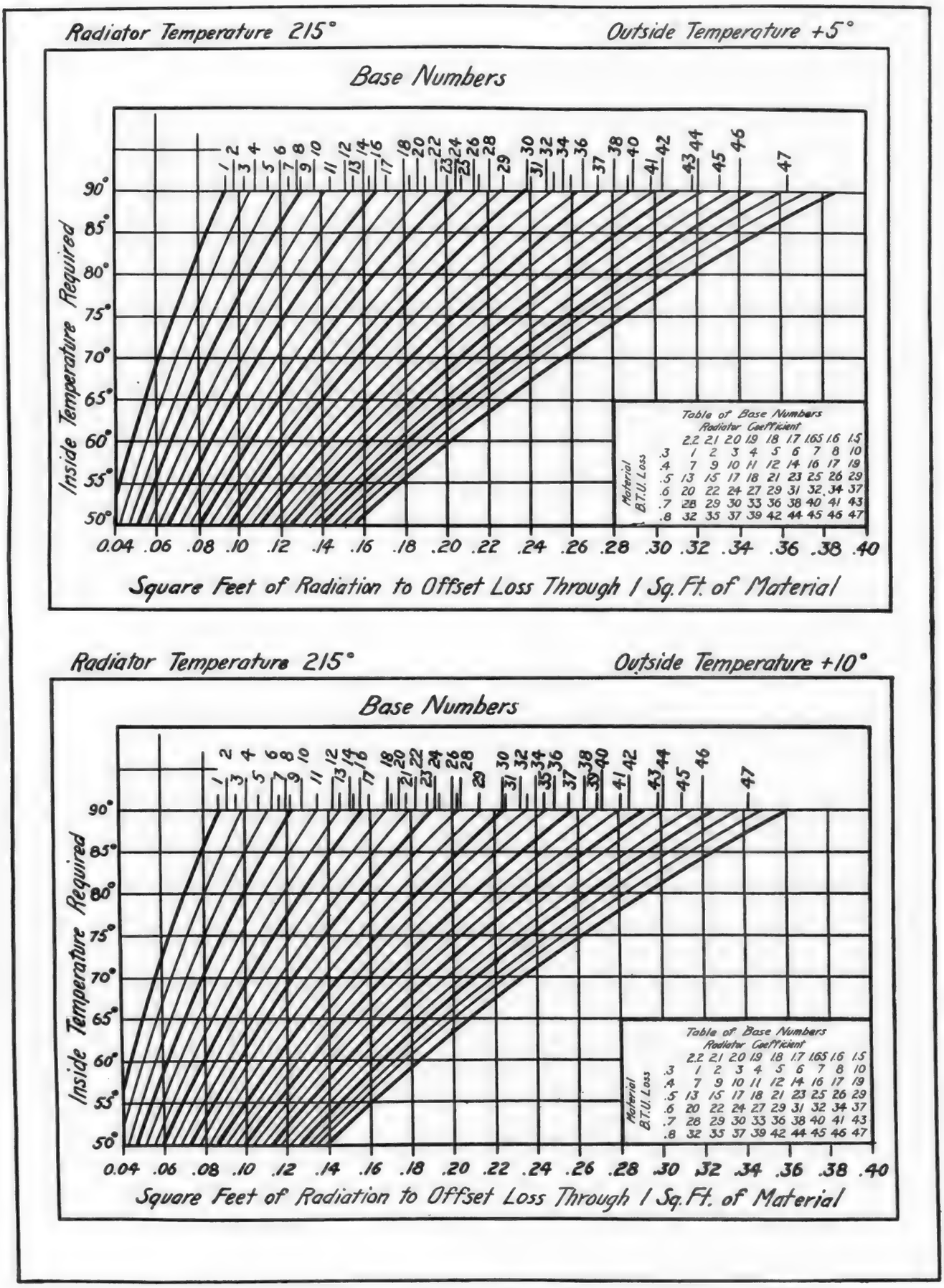
— 10°	- - 5°	0°
Birmingham, Ala.	Montgomery, Ala.	Anniston, Ala.
Little Rock, Ark.	Atlanta, Ga.	Mobile, Ala.
New Haven, Conn.	Shreveport, La.	Vicksburg, Miss.
Boston, Mass.	Baltimore, Md.	Raleigh, N. C.
Trenton, N. J.	Meridian, Miss.	Portland, Ore.
Santa Fe, N. Mex.	Atlantic City, N. J.	Columbia, S. C.
Buffalo, N. Y.	Asheville, N. C.	Richmond, Va.
New York, N. Y.	Philadelphia, Pa.	
Rochester, N. Y.	Block Island, R. I.	
Harrisburg, Pa.	Memphis, Tenn.	
Reading, Pa.	Abilene, Tex.	
Providence, R. I.	El Paso, Tex.	
Chattanooga, Tenn.	Lynchburg, Va.	
Nashville, Tenn.		
Amarillo, Tex.		

5°	10°	15°
Augusta, Ga.	Jacksonville, Fla.	Corpus Christi, Tex.
Thomasville, Ga.	Pensacola, Fla.	
Wilmington, N. C.	Macon, Ga.	
Dallas, Tex.	Savannah, Ga.	
San Antonio, Tex.	New Orleans, La.	
Norfolk, Va.	Charleston, S. C.	
Seattle, Wash.	Galveston, Tex.	
	Houston, Tex.	

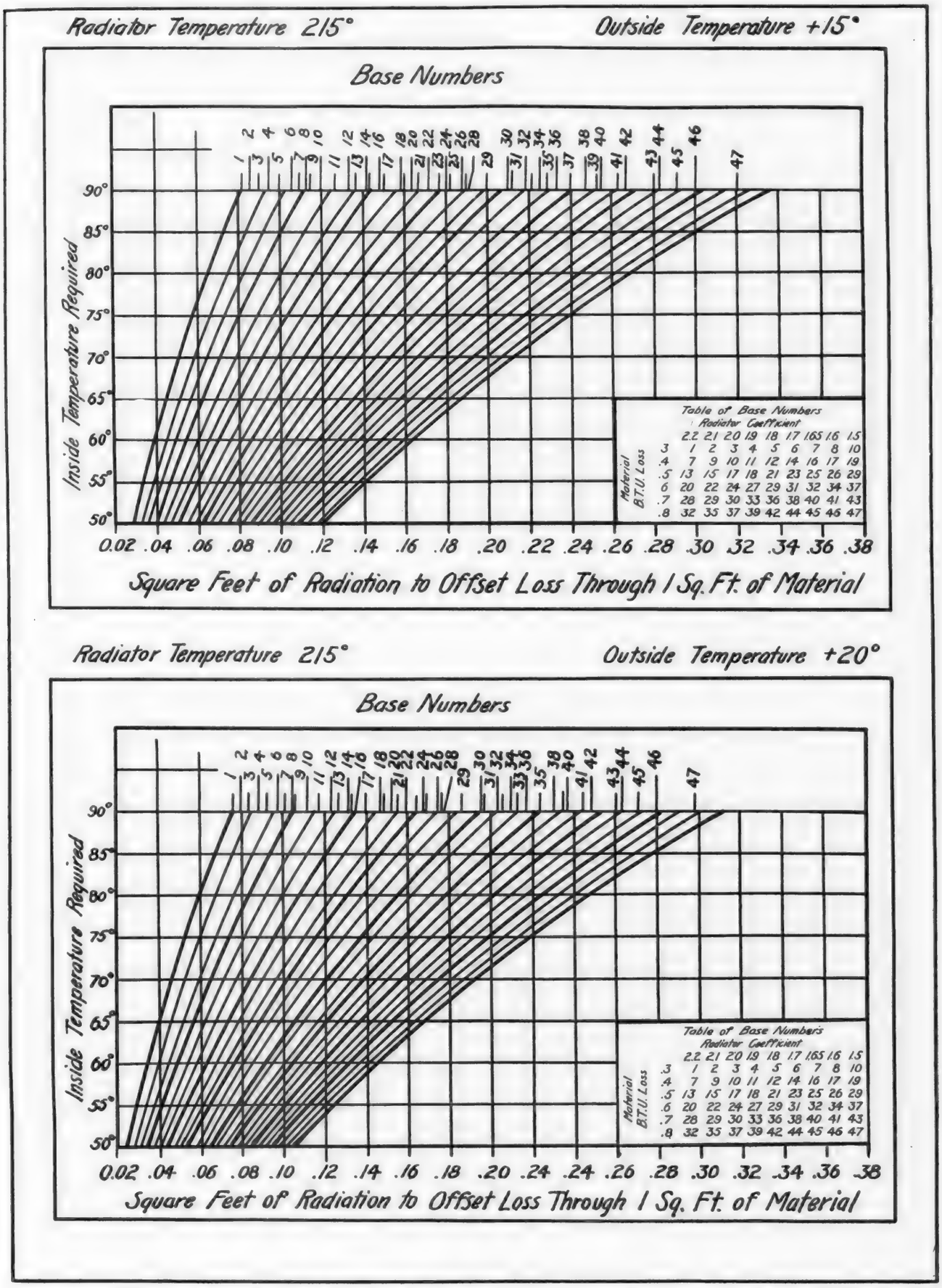
20°	25°	30°
Phoenix, Ariz.	San Diego, Calif.	Los Angeles, Calif.
Sacramento, Calif.		San Francisco, Calif.
Tampa, Fla.		Miami, Fla.



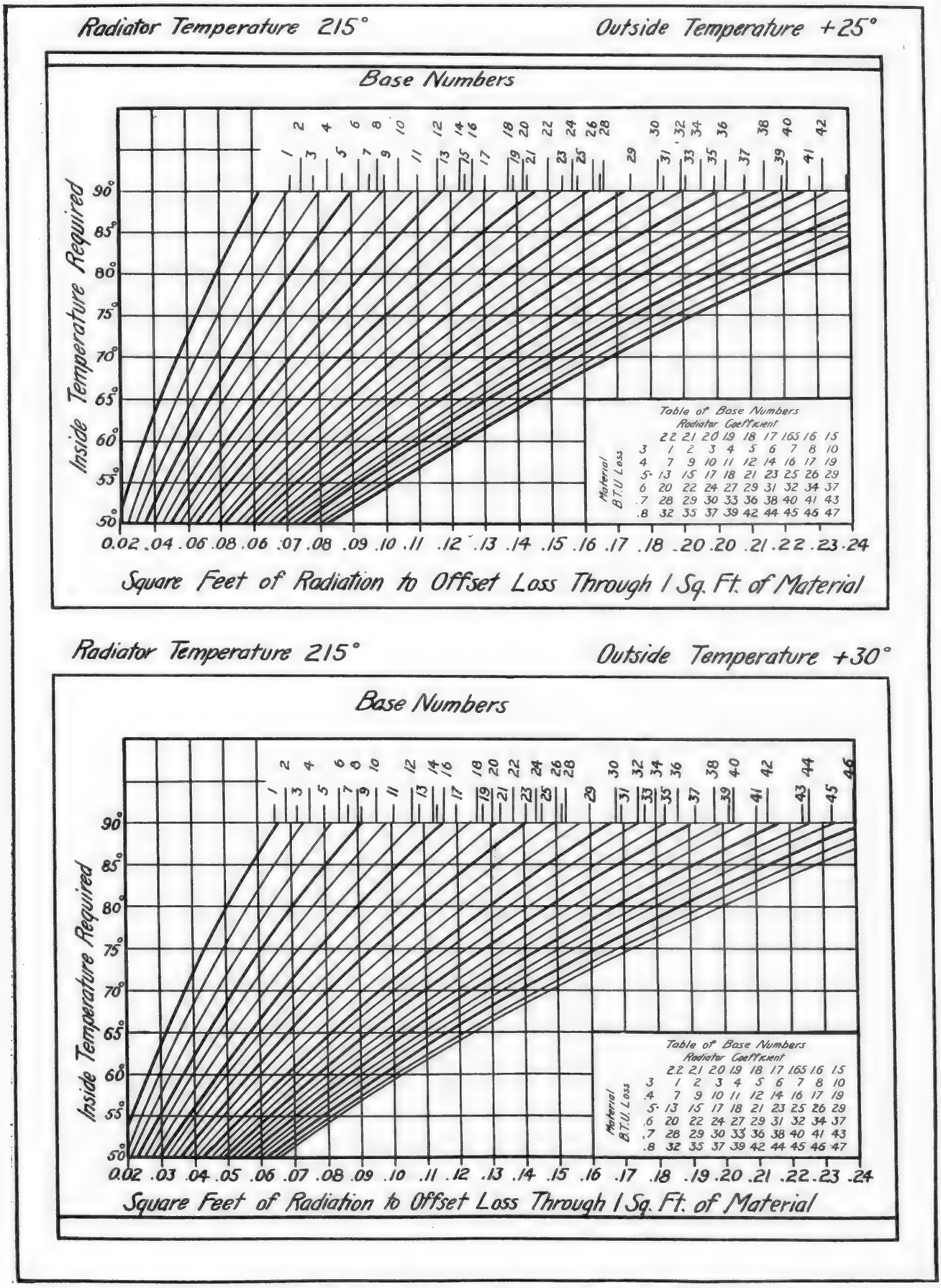
Charts for Determining Radiation Where Base Outside Temperatures Are — 5° and 0°



Charts for Determining Radiation Where Base Outside Temperatures Are 5° and 10°



Charts for Determining Radiation Where Base Outside Temperatures Are 15° and 20°



Charts for Determining Radiation Where Base Outside Temperatures Are 25° and 30°

For hospital-type radiators, multiply them by 1.07.

These coefficients were calculated from tables, "Heat Emitted by Direct Radiation," A. S. H. & V. E. 1928 *Guide*.

The advantage of these charts over the usual method is their simplicity and compactness. They are correct, and can be read to 1 in 1000; they embody variables of radiator efficiencies, wall construction, inside temperatures and the 10 charts are each for a different outside temperature. The only constant used is the temperature of the radiator, 215° F.

In order to make the charts more useful, the accompanying table of heat emission from radiators is included, taken from Webster's "Steam Heating." An additional table indicates the locations to which each chart applies.

B.T.U. Emitted per Hour per Sq. Ft. of Heating Surface* Radiators 10 Sections Long
Steam Temperature, 215° F. Room Temperature, 70° F.

Number of Columns	Height of Radiator In.	B.T.U. by Convection	B.T.U. by Radiation	Total B.T.U.	Per cent Convected Heat of Total Heat
One	38	150	106	256	58.6
One	32	158	108	266	59.4
One	26	162	111	273	59.4
One	23	160	119	279	57.4
One	20	166	117	283	58.7
Two	45	148	86	234	63.
Two	38	148	92	240	62.
Two	32	154	94	248	62.
Two	26	149	106	255	58.
Two	23	151	109	260	58.
Two	20	153	112	265	58.
Three	45	142	76	218	65.
Three	38	147	79	226	65.
Three	32	158	75	233	68.
Three	26	166	75	241	69.
Three	22	166	82	248	67.
Three	18	162	92	254	64.
Four	45	149	56	205	73.
Four	38	150	60	210	71.5
Four	32	151	66	217	69.5
Four	26	155	70	225	69.
Four	22	156	76	232	67.
Four	18	151	87	238	63.5
Wall radiation					
3 in. wide	14	152	171	323	47.
3 in. wide	22	154	156	310	49.7
3 in. wide	29	138	157	295	48.
Pipe coil	6—1¼-in. pipes			360	
Pipe coil	8—1¼-in. pipes			343	
Pipe coil	10—1¼-in. pipes			330	
Pipe coil	12—1¼-in. pipes			319	

*John R. Allen, *A. S. H. & V. E. Journal*—January, 1920.

Dynamic Significance of Static Pressure

(*Continued from Page* 67)

its shape, that is, gets longer; its cross section has decreased and the fluid particle has, in position 2, the same mass (or volume, as we are neglecting fluid compressibility) as in position 1.

Now, in position 2 the particle is moving faster than it did in position 1. What could have speeded up the motion of the fluid particle? The particle is in contact only with the surrounding fluid. Nothing else than this surrounding fluid can interfere with its motion. Therefore if the fluid particle, in passing from position 1 to position 2 has speeded up, this can only be due to the fact that the pressure in front of the particle is smaller than the pressure behind it. It is the *excess pressure on the rear of the particle* that must be the sole cause of its acceleration. So any particle undergoing *an increase of velocity*, as when moving from 1 to 2, must be moving *in the direction of decreasing pressures.*

We are thus brought to the fundamental conclusion that, when the velocity of a particle increases, the pressure of the fluid decreases in the direction of the fluid motion.

In the case B of Fig. 2, for exactly the same reasons as above stated, if the velocity of the fluid particle is decreasing in the direction of the motion, the pressure must be increasing, and in position 2 the pressure must be higher than in position 1.

Those who hear this conclusion for the first time probably are somewhat surprised because they are rather inclined to think that just the opposite should take place; viz., that the pressure should increase when the velocity increases.

It is not without interest to trace how most of us are subconsciously brought to such a false conclusion.

I believe there are two things that may induce us to reach, at first sight, the incorrect conclusion. The first thing is that most of us think of fluid pressure as velocity pressure and thus naturally feel that this velocity pressure should be higher where the velocity is higher. But, as already explained above, pressure (or static pressure), which is a fundamental characteristic quantity in the analysis of the phenomena of fluid motion, is a thing totally different from velocity pressure, which always should be called velocity head. Then probably we are subconsciously influenced by our experience concerning the behavior of powders. We involuntarily assimilate a fluid to a very thin powder. For example, when we want to fill a bottle with a powder by means of a funnel, we all know only too well, that if we will fill the funnel with powder and begin to press on it from the top, the powder will only get clogged up in the throat of the funnel. And the harder we press on top the tighter will it pack in the throat. Thus, in the narrowest section we do get the highest pressure. But the behavior of powders is essentially different from the behavior of fluids; very different in fact, as every one can judge by the ease with which a fluid will flow through a funnel. Also, when flowing through the funnel, there will be a decrease of fluid pressure at the throat because the fluid velocity there is the highest.

I hope that these explanations will make evident the fact that, for real fluids, the pressure always does decrease when the velocity increases and vice versa.

(*To be concluded*)

Fig. 1. The Genesee Hospital Group

The Status of District Heating

Part III—Rochester Gas & Electric Corporation's Extension of Heating Service to the Genesee Hospital

By F. G. Austin
Engineer, Rochester Gas & Electric Corporation

EARLY in 1924, a hospital drive was started to raise money to be apportioned among the several hospitals of the City of Rochester, N. Y., for the purpose of expansion, at such time, and in such way as the boards of trustees might think expedient. The increased population naturally had taxed the hospitals to the limit, and in order that the city might take care of its sick and conduct the proper clinics, it was necessary to have more buildings.

In the summer of 1925, the Genesee Hospital began the construction of a new surgical building—the first step of a comprehensive building program. This necessarily increased the steam demand on the boiler plant to such an extent that it was necessary either to build a new plant or to purchase steam.

Fig. 2. Lawn Street Steam Plant

The steam generation plant of the hospital consisted of three Erie fire-tube, high-pressure boilers of 50 H.P. each, in fair condition, but not good enough to re-set in the new building which would be required for the increased boiler capacity. Figures were carefully compiled by consulting engineers, and it was found that a new plant would cost $62,700. The building committee, being familiar with the merits of district heating, approached the executives of the Rochester Gas & Electric Corporation, with the thought in mind of constructing a line to the hospital which was 3800 ft. from the new Lawn Street steam plant, just being completed. An analysis of private-plant cost vs. purchased-steam cost was made, and the following balance sheet prepared:

Private Plant Operating Cost

Coal 2120 tons at $6 (Includes handling coal and ashes).		$12,700
Repairs, water and maintenance		500
Labor: 1 engineer	$2000	
3 firemen	1500	6,500
Total		$19,700

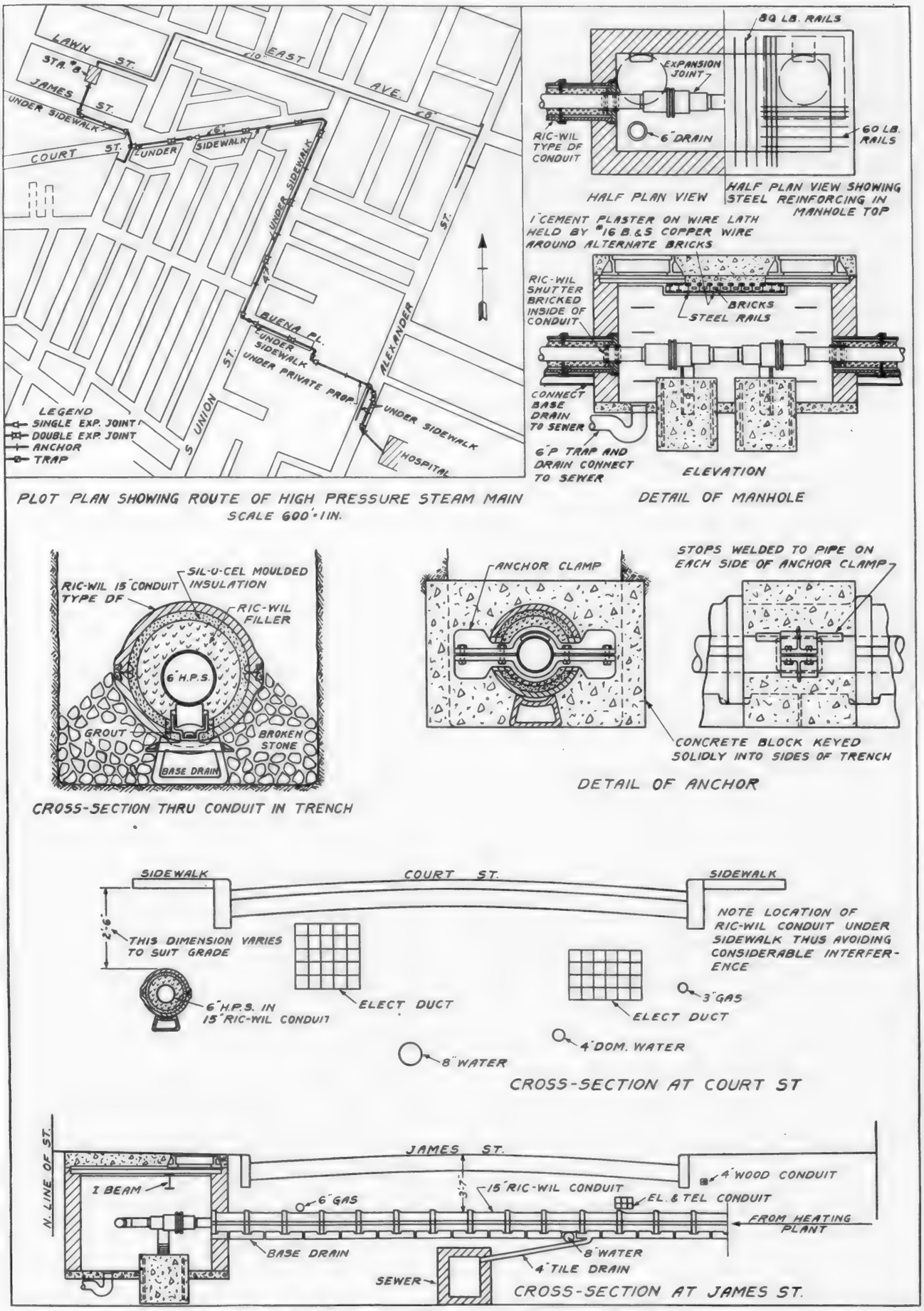


Fig. 3. Details of Steam Line, Genesee Hospital, Rochester, N. Y.

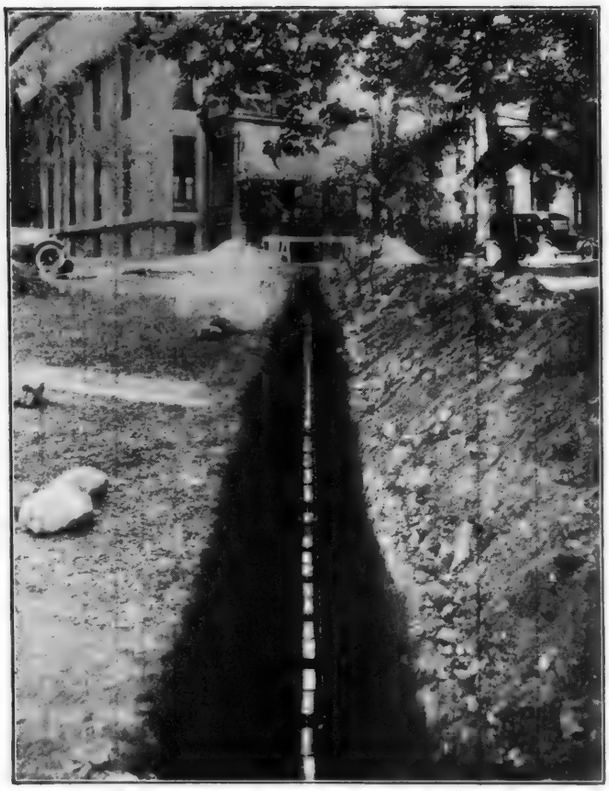


Fig. 4. Base Drain Foundation Installed to Grade

Fixed charges, interest and depreciation on investment of $62,700	$ 9,400
Total cost	$29,100

Rochester Gas & Electric Corporation Steam Cost	
25,500,000 lbs. of steam	$24,000
Interest and depreciation, 15% on $1000, cost of piping inside building	150
	$24,150

Yearly saving in favor of purchased steam, $4,950.

DETERMINING HEATING-COST FACTORS FOR EACH ELEMENT

Using district steam would eliminate the cost of the boiler plant from the capital charge, permitting a considerable sum to be devoted to hospital buildings which would house probably an additional 50 beds.

In addition to this, a careful analysis of the heating requirements was made of each room—warming cabinet, sterilizer, laundry, kitchen—and the amount of steam each consumed was carefully checked and a factor determined which, multiplied by the monthly steam bill, would give the amount in dollars the steam would cost for that room or department.

For example, a typical floor consisting of 14 beds, a kitchen, linen closet, office and hall, would have a factor of 0.013 which, multiplied by the yearly steam cost, would give the cost of heat for that floor per year. This has been very useful in determining which rooms or floors are self supporting and which are not. The estimated steam consumption for the entire year was 25,000,000 lbs., and the hospital has kept well within this estimate.

HIGH-PRESSURE DISTRIBUTION

A survey of the territory was made with the thought in mind of present and future development. It was decided to install a 6-in. high-pressure main for the first 1500 ft. and a 4-in. high-pressure main the remaining distance, designed for 375 lbs. pressure and 100° superheat, at a cost of $80,000. At the same time economy and speed were the two prerequisites, because it was late autumn and the hospital would need steam in a short time.

The reason for the 6-in. main was that the territory served by this main is nearest the center of the future large building district and it could be used as a booster for an 8-in. low-pressure line, which is only a few feet from where the 6-in. main reduces to 4 in. It is possible to run laterals in other districts, to cross East Avenue and parallel the 8-in. low-pressure line, for a customer who desires steam all summer, because steam is on this line the entire year.

This line is advantageously placed, as may be seen in Fig. 3, together with details of the construction used. The business blocks along this main, together with the dwellings, very quickly availed themselves of steam service and this has worked out advantageously for both the Rochester Gas & Electric Corporation and the hospital.

A maze of electric ducts, gas and water piping under the streets, along whose course the main was to follow, would have necessitated burying the main

Fig. 5. Conduit Under Pavement Complete to Manhole

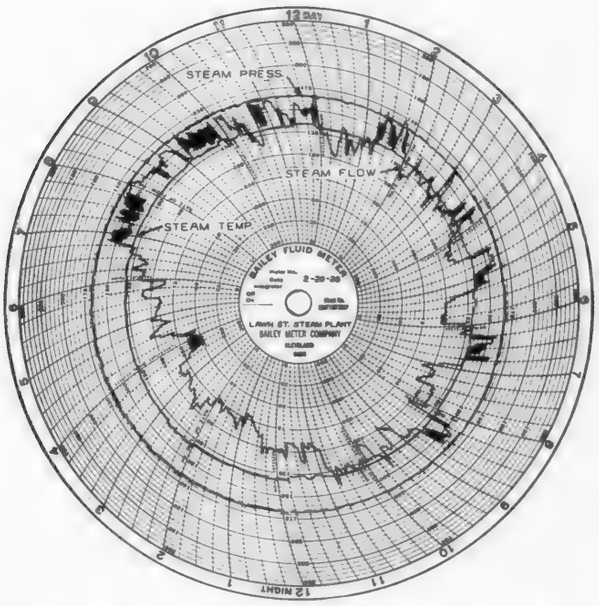


Fig. 6. Chart from Bailey Meter at Lawn Street Steam Plant

8 ft., and heavy traffic would make repairs difficult. Consequently it was decided to place the main under the sidewalk at a depth of 4 ft. The installation was materially expedited thereby.

TYPE OF UNDERGROUND CONSTRUCTION

One of the next factors for consideration was the type of construction to be used. The company had, in general, used two types; Ric-wiL conduit and insulation and the concrete box with sectional pipe-covering. It was decided to use the former with moulded and loose filler insulation and base-drain foundation.

This line was installed during the rainy season of late autumn and, as expected, it rained nearly half the time, but even with this delay the work was completed in two months. Fig. 4 shows the base-drain foundation which serves the double purpose of providing positive trench drainage and furnishing a two-point support for the conduit. The shallow type of trench used is illustrated in Fig. 5 which shows the conduit on Union Street.

A general contract was let to the American District Steam Company of North Tonawanda, N. Y. The following are the approximate costs of this installation:

	Cost per lineal foot
Trench work and relaying pavements	$ 8.50
Conduit materials installed	4.50
Manholes, anchors and pipe work	8.00
	$21.00

THE CENTRAL STEAM PLANT

Steam is taken from the new Lawn Street plant, which was designed primarily for heating the downtown section of the city. Radiating from it is about 20 miles of equivalent 4-in. pipe. There are three, 1100 H. P. Bigelow-Hornsby boilers, using pulverized fuel. These boilers are capable of generating 380,000 lbs. of steam per hour, and the increased heating load made it necessary to install the third boiler during the summer of 1927. This plant is built in such a way that an addition can be made to the building and more boilers added which will provide ample capacity for some time to come.

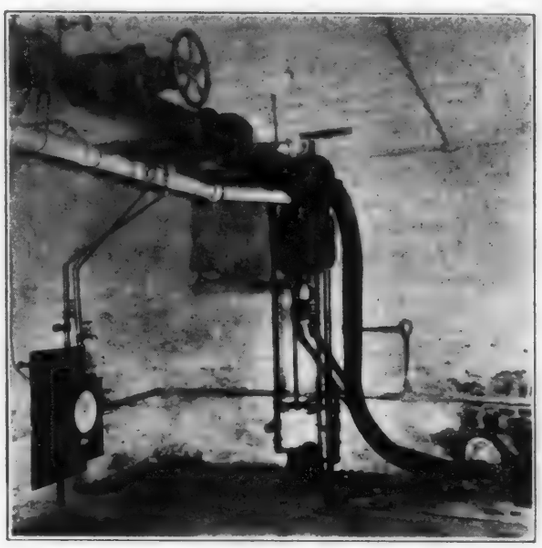


Fig. 8. Bailey Flow-Meter Connected to Steam Supply Pipe

After two years' operation, this hospital service has proved very successful, as is borne out by figures taken from tests on line loss and efficiency, which are as follows:

Pressure at Station No. 8 (steam plant) . . 165 lbs.
Pressure at end of 6-in. line, 1500 ft. from station . . . . . 145 lbs.
Pressure at hospital, 3800 ft. from station . 100 lbs.
Temperature of steam at station . . . . . 470° F.
Temperature of steam at end of 6-in. line . . 420° F.

(*Continued on Page* 83)

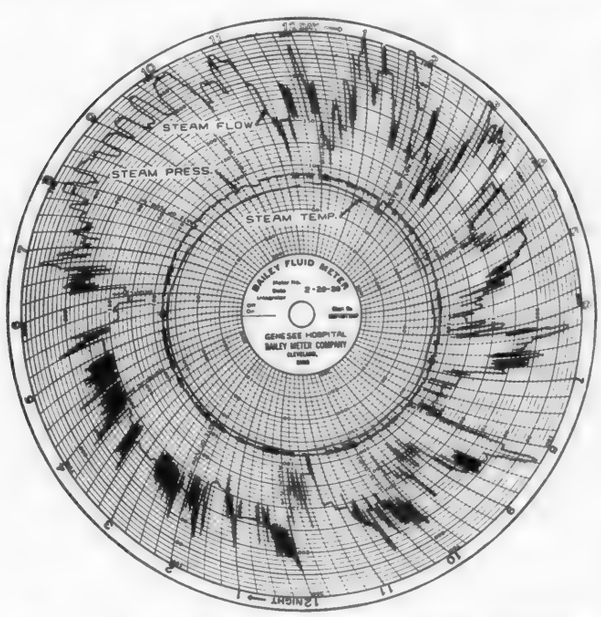


Fig. 7. Chart from Bailey Meter at Genesee Hospital

Heating and Ventilation Specifications

Part III—Their Composition to Suit the Conditions of Practical Work

By Harold L. Alt

THE next thing to be considered after the matter of a deposit and bond has been specified is, what is going to happen to the deposit after the bond has been satisfactorily executed. For this purpose a paragraph such as is given in GC-3 may be used. The paragraph also should include a forfeiture-of-deposit clause for failure to execute the bond agreed upon.

GC-3 RETURN AND FORFEIT:

The checks of the unsuccessful bidders will be returned to them upon the signing of the contract; that of the successful bidder upon the execution of the contract and bond.

Should the successful bidder refuse or neglect to execute a contract and bond, his check shall be forfeited to the Owners as liquidated damages.

It often will save time and argument if the exact form of proposal is given, with the instructions to bidders that "this is the *only* form that will be acceptable." This puts all bidders on an equal footing and insures legitimate bidders (who submit a bona fide price) against being thrown out because they have forgotten something in the specifications which should appear in their proposal, such as the deposit or price on alternates.

Therefore, a common form of proposal not only helps the bidders in telling them just what information should be submitted but also is of value to the owner and engineer as a guarantee that competition will not be limited, inadvertently, through errors made in various proposals of such a nature as to prevent their consideration.

A good type of proposal, somewhat more complete than the form previously taken from No. 6, is given in GC-4.

Having listed the sub-contractors in the "Form of Proposal" (in the next column), it naturally follows that the Contractor must be informed of just what portions of the work are intended to be included under this designation. It is usual to require the names of sheet-metal contractors, covering contractors, boiler and stoker contractors, foundation and any other contractors doing work not strictly heating and ventilating, or which in all likelihood will not be done by the contractor himself or his organization.

A paragraph, such as is given in GC-4, followed by a suitable list of work to be designated, clears up any question which may exist in the bidder's mind as to just what may be expected or implied in the form of proposal for this particular item.

GC-4 FORM OF PROPOSAL:

Proposals shall be made on the Contractor's stationery in the following form only, without alteration, interlineation or addition:

.....192..

Mr. John Smith, Owner,
Address.....
City.....

Dear Sirs:—

....,hereby agree to furnish, deliver and erect ready for service in the..... a complete ..... all as shown and described in the drawings and specifications prepared by....., Engineer (and.....Architect), dated.....192.., all work under the proposal to be in strict accordance with said specifications and drawings, and to the entire satisfaction of the Engineer (Architect) and Owner; ....price for the complete work is..... Dollars ($.....).

.....certify that.....have carefully read the specifications and examined the drawings and that ....understand them perfectly.

It is agreed that the above amount shall be in full for all expenses attendant upon the work, and its direction, and for any unforeseen delays, accidents or other expenses which may arise.

....also hereby agree to indemnify and hold the Owners harmless against all claims for damages to person or property growing out of this work or materials used, and will assume defense of all other claims and pay any judgment recovered.

....certified check for.....Dollars ($.....), as required, is enclosed herewith as a guarantee of....intention of executing the bond and contract should....tender be accepted.

....propose to use materials and sub-contractors as follows:

(Give list here as required)

(Signed).....

In order to protect the Owner against any contingencies which might arise before the tenders are received, as well as against the matter of having to accept exorbitant bidding, it is a practice in almost all specifications to insert a clause that the Owner is not bound necessarily to accept any of the bids submitted.

The Owner must also be protected against suits which might be brought by rival bidders claiming damages for a contract awarded not within the strict letter of the proposals as originally tendered upon.

GC-4 LIST OF MATERIALS AND SUB-CONTRACTORS:

Each bidder shall give in his proposal the following information regarding materials and sub-contractors to be furnished or employed, subject to the approval of the Engineer, which statement shall become part of this specification and contract and shall not be changed without the written consent of the Engineer. One name must be inserted after each item and the material shall, in each case, be as specified.

(Give list here of items desired)

The furnishing of special details of various parts of the work as the installation progresses, the temporary holding up of the work from any cause whatsoever, and the letting of any other contracts in connection with the work are all privileges and rights of the Owner, which the bidders must concede.

While it is true that there are cases where the Owner abuses the matter of taking bids, it is not the practice usually to do so, and the first bids often are the only ones secured.

These rights and privileges are secured to the Owner by the various reservations listed in GC-5.

GC-5 RIGHTS RESERVED:

The right is reserved to reject any and all bids without compensation to the bidders; to waive defects of informality in any bid; or to award subdivision of the work to different contractors if it be judged in the interests of the Owner to do so.

The right also is reserved to furnish any detailed drawings which in the judgment of the Engineer may be necessary, and such drawings shall form part of the contract. Any work done without such drawings shall be at the risk of the contractor.

The right of the Owners to temporarily suspend any portion of the work also is reserved.

The right is reserved to let other contracts in connection with this work.

Questions often arise on specifications, after the installation is under way, as to just who may be meant when the specifications speak of the Owner, the Architect, the Engineer, and the Contractor.

Will the Owner himself give certain decisions; does the architect's superintendent bind the Architect by his decisions; are instructions issued to the Contractor's foreman binding on the Contractor?

It is advisable to define just who is intended by each of these designations as used in the specifications. The paragraph GC-6 covers this point.

It will be noted that a "representative" of any of the contracting parties, authorized to act for his principal, is considered as the principal in this interpretation.

GC-6 DEFINITIONS:

Whenever the word "Owners", or "Owner", or a pronoun in its place occurs in this specification it is understood to mean..... acting either directly or by authorized representative.

Whenever the word "Architect", or "Architects", or a pronoun in its place is used in this specification it shall be understood to mean .....acting either directly or by authorized representative.

Whenever the word "Engineers", or "Engineer", or a pronoun in its place is used in this specification it shall be understood to mean..... acting either directly or by authorized representative.

Whenever the word "Contractor", or the words "this Contractor", or a pronoun in place of same is used in this specification it shall be understood to mean the individual, firm or corporation to whom the whole or part of the work embraced in this specification shall be awarded, acting either directly or by authorized representative.

Still another doubtful word which frequently occurs is "equal", "equal approved" or "as approved by." Who is to decide the equality; who is to give approval of materials and what is an "approved" material?

Enlightenment on this matter is provided in GC-7 which states just what is intended when these words are used.

GC-7 APPROVAL OF MATERIALS AND WORKMANSHIP:

Wherever the words "equal", "equal approved", "as approved" or "approved by" occur in this specification applying to materials or workmanship to be used on the work, it must be understood that this refers to the approval of the Engineer (or Architect) as applied to the materials, workmanship or sub-contractors used on this particular work. Substitutions of materials can be made only as provided under "CHANGES OF MATERIALS."

(*To be continued*)

Huge Compilation of Weather Records

THE Smithsonian Institution recently has compiled and published a vast collection of weather records from 387 stations widely scattered over the world. In a volume of about 1200 pages, this work presents the mean monthly values of temperature, rainfall, and barometric pressure for the entire period of trustworthy observations at the places selected. Several of the records cover more than 100 years, the oldest of all being the temperature record for Charleston, S. C., which was begun by Dr. John Lining, in 1738. The compilation of the data and their publication in this valuable volume were made possible by funds contributed by John A. Roebling.

"The Next Size Larger"

II—European Practice in Low-Pressure Steam Heating

By J. Blansjaar
Heating Engineer, Enschede, Holland

IN calculating the pipe sizes of a steam heating system, we follow the same method as for hot water. Before giving a detailed description of the calculations, it is necessary to ascertain what is the difference between American and the European practice in steam heating.

The European system of steam heating consists of a boiler with a gauge and a manometer, a "standpot" (which is a very accurately-working safety loop), the piping, the radiators and the regulating valves. No traps, no air valves and no feeding devices are used. The return main is brought into communication with the atmosphere by simple ½-in. pipes, with no air valves at all. Water of condensation, when flowing from the radiators into the boiler, meets no trap or valve; it only passes through the piping.

FUNCTION OF THE STANDPOT

Two conditions have to be met to obtain such a simple installation. The first is that the steam-pressure never may exceed a certain amount. This is the function of the "standpot." The second condition is, that all of the steam pressure should be used by the time the steam reaches the end of every radiator. Only a very accurate calculation, followed by a painstaking regulation of the radiator valves, makes it possible to meet the second condition. When the steam pressure does not exceed the prescribed amount, the horizontal return main stays dry, and, when large enough, air may pass through it.

But traps and automatic air valves can be omitted only when, with every possible pressure and temperature, all the steam that comes into the radiators condenses there.

Calculation of steam pipe sizes cannot be made as accurately as in the case of hot water piping. However, with the regulating device built in the valve, all the pressure not used in the pipe can be throttled off.

DIFFICULTY OF MEASURING INFLUENCE OF CONDENSATION FLOWING WITH OR AGAINST THE STEAM

The reason why the calculation of steam piping is less accurate is the impossibility of measuring the influence of the water of condensation flowing with or against the steam. It is not so difficult to ascertain the amount of steam condensing in a pipe. One begins by taking the steam loss at, say, 10%. This means that, at the beginning of the main, 10% more steam has to be supplied than is to be delivered at the end. This 10% disappears completely along the piping; the water taking its place has practically no volume.

On an average the pipe has to be calculated for 5% extra steam delivery. If the pipe is part of a normal steam heating line, there is no need to make a more accurate calculation of the steam loss. With very long steam lines, such as those for district heating, etc., the true steam loss has to be determined and if the difference from the estimated steam loss is too large, the pipe diameters have to be recalculated with the newly-found values.

When the water of condensation flows in the same direction as the steam, its influence on the velocity and the friction practically is nil. When, however, the directions of both are opposite, then this influence can be very great. The water flows only by the force of gravity and is kept back more or less by the friction of the steam against it.

In risers, where the height of the pipe relative to the distance to be covered is a maximum, the velocity of the water is greatest and the space occupied by the water very small.

The area of the water stream is equal to the volume of water per second, divided by the velocity. The friction against the steam is greatest when the relative velocity of both is the highest.

Worst of all are the branches of a steam line where water cannot be tapped off at the end. The water has to flow against the steam. The inclination of the pipe is slight, so is the velocity, and the area of the pipe occupied by the water is very large.

It is easy enough to make the diameter of these branches one or two quarters of an inch larger, but there remains little of accuracy in the calculation. The best practice is to take 20% to 30% of the total pressure for resistance at the radiator valve, branch, etc., and to calculate the piping with the rest of the pressure.

As a large percentage of the "accidental resistances" is to be found at the radiator, and as this part drops out of the calculation, the extra allowance for "accidental resistances" can be diminished to 50% for a complete circuit. For parts of a circuit, the allowance can be reduced in the same degree. With these exceptions, the calculation of a steam line is the same as of the hot water line.

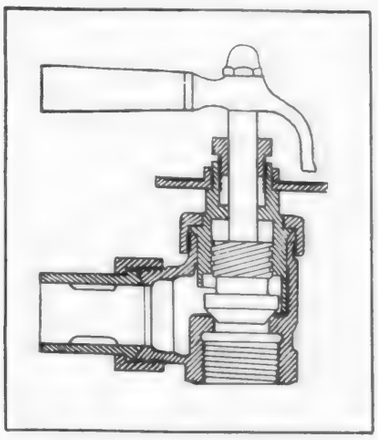
The returns require very little calculation. Professor Brabbée gives only a small table, divided in four columns, one for wet returns, and three for dry returns, with small, medium and large distances.

Every steam heating system ought to be regulated when ready for operation. The regulating

valves are throttled until only water comes out of the radiator. Valves used for water are not fit for steam use. The disc either sticks fast to the housing, or lets steam pass, when closed.

TYPICAL STEAM RADIATOR VALVE

A type of steam radiator valve, common in Europe, is surrounded by a cylindrical mantle. The



Section of Typical Continental Steam Radiator Valve

mantle can be turned and in one position closes the hole in the side of the housing. The degree of throttling of a hot water valve may be noted from the length of the spindle above the housing. In the steam valve this limit is indicated by a mark on the housing and a numbered scale on the top part of the mantle extending for the housing.

When, in this manner, each radiator gets no more steam than can be condensed in it, only water gets in the return and air vents can safely be placed in the cellar, or on the top of a return riser in the loft, etc. When steam comes out of an air pipe, one can be sure that somewhere a radiator is not regulated, or, as we call it, "strikes through."

Every sort of pipe line can be calculated in this way. The calculation always follows the same line, only the tables vary with the fluid to be transported, and the material of the pipes. Brabbée gives tables for hot water, low-pressure steam, high-pressure steam, also for air through iron or brick channels of round, square or rectangular form.

Thousands and thousands of installations have been calculated in this manner, and every one of them from the smallest to the largest has done what was expected of it and has done it accurately. I have not seen the American edition of the "Leitfaden" of Rietschel-Brabbée so it may be that Professor Brabbée gives his tables a somewhat different form, but the method of calculation, I am sure, will be quite the same.

At first the method here described may seem like a great deal of work to be done, but I am convinced that in the end this method will conquer America as it has conquered Europe.

The Status of District Heating

(*Continued from Page 79*)

Temperature of steam at hospital.....360° F.
Efficiency of 6-in. line compared with bare pipe in still air (impractical to test efficiency of 4-in. line on account of service connections) 90.1%
Line loss, average for heating season...8% of flow
Line loss for January and February .3.37% of flow
Line conductivity per square foot of pipe surface per degree difference in temperature between steam and ground.....
0.15 B.T.U. per hr.

Figs. 6 and 7 show charts taken from both ends of the line, and Fig. 8 shows the Bailey flow-meter connected to the steam supply pipe. The hospital is charged with the steam supplied, as indicated by the flow meter at its end of the line. Its consumption during the heating season is about 6500 lbs. per hour and considerably less during the summer. Actually, the total steam required by the hospital per year amounts to 21,500,000 lbs., which is 8% less than the amount estimated for cost purposes.

Due to the fact that this is a high-pressure line, the details of its construction were checked carefully and watched, the pipe was tested to 700 lbs. hydrostatic pressure and an impact test given each weld. These welds were of the electric-arc type, carefully made. Up to the present time the hospital has experienced no trouble and the line has been referred to as one of the company's most reliable and dependable branches of steam service.

What Determines Rating?

At times during the discussion of the proposed A. S. H. & V. E. boiler-rating code it has been demonstrated that there is considerable confusion regarding just what is meant by a boiler "rating." In a recent issue of *Power* there appeared a picture illustrating the crux of this matter in a way that could not be accomplished by mere words. The photograph bore the caption: "Totally-enclosed forced-ventilated motor rated at 300 H.P. Without ventilation this motor would be good for a 30-H.P. load only."

Here is the whole story in a nutshell. This motor under certain conditions would be rated as 30 H.P. Yet it is perfectly possible by changing the conditions to produce a motor that will deliver continuously 300 H.P.—a load ten times as great as in the former case. This illustration is an excellent illustration of the fact that a motor may be rated at one output under given conditions and at another output under different conditions. Likewise, the only way boilers can be compared is to have them rated on an identical basis.

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AS an epitome of the latest thought on the subject of heating and ventilation in public buildings, we commend the conditions set forth by the Advisory Committee to the United States Public Health Service for the ventilation of the Capitol, in Washington. Strangely enough, this committee is headed by Prof. C.-E. A. Winslow, of Yale University, who has figured so prominently as a champion of open-window ventilation.

In a series of resolutions the committee goes on record as advising that: "For summer conditions the plant should be capable of maintaining in the chambers, during periods of maximum occupancy (Senate 1200; House 1600), a temperature not in excess of 75° F., with a relative humidity not in excess of 55%, with outside weather conditions of 95° F. dry-bulb and 75° F. wet-bulb. The plant should be capable of maintaining in the chambers during the winter a temperature up to 75° F., with a relative humidity of 30% to 50%, and this shall be accomplished without noticeable drafts and without noticeable odors in any part of either chamber, as measured by a variation in CO_2 content in excess of four parts per 10,000, between different points in the chamber." The items of dust and bacteria are not provided for "for the reason that they are not regarded as of importance, and, in any case, the operation of the plant will take care of this matter adequately."

In the second resolution, it is stated that: "Such conditions, in our judgment, can only be realized by a system operating on the downward principle, that is, with the air flowing from the ceiling toward and out through the floor, with careful provision for initial horizontal diffusion, capable of delivering a maximum of 45 cu. ft. of air per person per minute, and of variable capacity through means of speed control of fans to a minimum of 10 cu. ft. of air per person per minute, both figures being based on the figures of maximum occupancy of the chambers, and with temperature and humidity control adequate to meet the range and limits stated above."

Finally, in the third and last resolution, the committee holds that: "In general, comfort will be most effectively secured in cold weather by maintaining in the chambers a temperature between 66° F. and 70° F., with a respective relative humidity of 50%-40%, and in warm weather by keeping the temperature 10°-15° F. below the outdoor temperature, with a relative humidity of not over 50%. If it is desired to maintain higher temperature in winter, the relative humidity may be decreased correspondingly to 30% at 75° F."

WHEN any branch of industry attempts to formulate engineering codes for its guidance, it is necessary first to establish test codes for securing, in a logical manner, the necessary *performance* data. The next logical step is a rating code by which we may *compare* performance or suitability for any given task. The heating and ventilating industry is a step ahead in this respect because its existing codes have followed the proper order.

As time goes on, a further refinement in the compilation of codes may be expected as the result of research work already undertaken or contemplated. Research has come to the fore and by its aid we have learned that the B.T.U., while a fixed quantity, is not necessarily uniform in its effect. The basic research of Brabbée, for instance, has shown that heat liberated near the ceiling has little value as affecting human comfort, compared with the same amount of heat liberated at the floor-line, so we have learned that the problem of heating a given inclosure is not solved necessarily by the liberation of heat at a rate equal to the heat loss in the same period of time; rather it involves the liberation of the minimum amount of heat required to produce a definite comfort condition. We must begin to refine the utilization of heat, rather than permit a continuation of its wasteful use. "Efficiency of Utilization" may well be adopted as a new slogan for engineering effort in the heating industry.

American Oil Burner Association

Fifth Annual Convention Imparts Sense of Stability to Oil-Burner Industry

Attendance of Nearly 2000 Delegates Testifies to Important Status of This Group in the Heating Field

EIGHTEEN hundred and forty-five registered delegates combined to make the fifth convention and exposition of the American Oil Burner Association, by far, the most impressive of the association's annual gatherings. Held at the Hotel Stevens, Chicago, April 3-5, with nearly one hundred manufacturers exhibiting oil burners and appliances in the basement exposition hall, and with simultaneous meetings devoted to engineering and to the sales phases of oil-burner problems, little daylight time was available for quiet meditation. The evenings, too, were crowded as the Chicago Oil Burner Association was determined that the entertainment program should far surpass all previous attempts in this direction. Elaborate functions in afternoon and evening gave visiting ladies an opportunity to see the Windy City at its best, and, although there was much jocular comment on the subject of banditry in Chicago, it is said that not a single visitor to the convention was "bumped off" or went home with a bullet-perforated hat as a souvenir.

J. C. Johnson
Newly-elected President of the American Oil Burner Association

The exposition hall was a crowded and busy area during its open hours. Learning from past experience that a speaker's program would not draw a crowd while oil burners were to be inspected, the association closed the exposition hall at all times when convention sessions were in progress. The exhibits, as a whole, were attractive and represented the peak of oil burner and accessory development.

A well-balanced program included papers by prominent authorities on almost every subject in which there was general interest.

Owing to a diversity of interests of members, simultaneous meetings were held for manufacturers and for dealers, the former devoted to manufacturing and technical subjects, and the latter specializing on matters of sales and installation.

Papers or reports dealing with research on oil combustion or allied problems were conspicuous by their absence. It would appear that this phase is being submerged under a superior desire to build up sales organizations.

The number of heating contractors participating in the convention as agents or representatives of oil-burner manufacturers was so small as to be noticeable. Comparatively few executives in the oil-burner industry appear to have tied up to the heating contractor as an outlet, preferring to establish sales offices in charge of salesmen who have had pseudo-training in factory schools.

The net result is that these two phases of a common industry are, as yet, unmerged, much to the detriment of development in both.

The Chicago-night entertainment in the grand ballroom, under the auspices of the Chicago Oil Burner Association, was a huge success and set a mark that it will be difficult for future groups to emulate. The selection of J. C. Johnson, as president, was a happy choice of the directors and brought to the leadership of the association one of the real pioneers in the oil-burner industry—a man with a quarter-century of experience in oil combustion, an able business man who has built up one of the strongest organizations in the country, and a man with such a charming personality that his friends and acquaintances are identical.

Lionel L. Jacobs, retiring after two years in the presidential chair, carried with him a very warm appreciation of his untiring efforts on behalf of the association—efforts that constituted an important factor in the growth and solidarity of the organization.

Morning Session, April 3

The forenoon was devoted to registration of delegates and guests and to a meeting of the board of directors. At 9 o'clock the exposition hall was thrown open to all who had registered. The exhibits were all in place and between the opening hour and noon over seven hundred visitors passed through the doors.

Afternoon Session, April 3

President Jacobs opened the general meeting on Tuesday afternoon with an address of welcome in which he touched briefly on points of interest to association members. He spoke frankly of the unanticipated slump which was experienced by nearly all manufacturers last year with disastrous results also in the dealer field. He told of the constructive work being done by the association and, in particular, mentioned the struggle to secure such specifications as would insure uniform fuels, the survey-analysis of so-called oil-burner fires, and the preparation of a uniform ordinance that has had a wide acceptance throughout the country.

"Hearty co-operation of the National Fire Protection Association and Underwriters' Laboratories has resulted in a modernization of the underwriters' code," said Mr. Jacobs. "Another valuable asset to the industry, when completed, will be the survey now being made by the Department of Commerce with relation to foreign markets. It is anticipated that the results of this study will be made public before the expiration of this year." President Jacobs called attention to the activities of the many committees, now at work, as indicating a desire on the part of many company executives and individuals to carry on a constructive program. He briefly summarized the functioning of the Oil Heating Institute and stated that during the past year more than 17,000 inquiries were answered and that, in reply to a questionnaire, it had been definitely proved that more than 600 people had purchased oil burners after having received this service.

Mr. Jacobs brought out the remarkable fact that, as a result of the issuance of a special booklet to 7000 architects, correspondence had been initiated with 4000 architects who evinced interest in oil burning. In concluding, Mr. Jacobs pointed out that the sales during the first three months of this year indicated clearly that the industry had pulled out of the slump and that steady progress with a reasonable increase over the 1926 business could be expected.

OIL-BURNING DEVELOPMENT AS VIEWED BY OIL PRODUCERS

President Jacobs then introduced B. L. Majewski of the Shaffer Oil and Refining Company, who spoke on "Our Common Interests." The speaker dismissed the bugaboo of coal, as a competitive fuel, and said that the tactics of the coal industry in publishing reports of alleged oil-burner fires, and otherwise endeavoring to frighten prospective oil-burner purchasers, would boomerang and prove a very unwise policy for the coal people themselves.

Considering gas as a competitive fuel, he stated that his analysis of the situation indicated that if the oil-burner interests properly correlated and handled their business-getting campaign, oil would become the recognized domestic fuel of America before the gas interests could get under way in their campaign to dominate the heating field.

American oil production, excluding Mexico, last year amounted to 894,453 million barrels of oil, according to Mr. Majewski, and there is every indication that the question of oil supply need not worry the American home owner in the least. The index of prices of other commodities, since the war, has shown an average increase of 50%, while the price of oil for domestic use remains the same.

"In 1922," Mr. Majewski said, "the oil companies became interested in the development of domestic oil-burning and several surveys were conducted to bring out the salient points. While these indicated that several hundred manufacturers, or near-manufacturers, produced oil burners, a great many of these were sold only in restricted areas and were carelessly sold and improperly installed. The ill effects of this bad beginning are even now felt in the industry, and it will require quite a concerted effort on the part of stabilized manufacturers to change this condition to a point of entire satisfaction, where every burner installed is properly put in by competent mechanics and gives a high degree of satisfaction to the home owner. The oil companies have taken this matter seriously and my own company has 3000 gasoline service-stations, every one of which bears a placard 'Heat With Oil'."

Mr. Majewski stated that his company had spent $25,000 in advertising oil for heating and in training men for its service department. He emphasized the point that it is not desirable to install tanks with capacity less than 500 gal. and that 1000-gal. tanks could better be put in as a minimum. He made a point that trouble had been created in certain districts where oil-burner dealers favored certain oil companies and furnished them with a list of prospective customers. He stated that this principle was detrimental to the best interest of all concerned and that all oil companies operating in a given territory should simultaneously be furnished with such information, letting the best equipped companies secure the business in a natural way.

President Jacobs then presented Charles K. Nichols of the New York Edison Company, who sketched the development of the central station industry. "The first output of the electric plant was almost entirely for illuminating purposes," said Mr. Nichols. "Then came the advent of motor loads and their tremendous increase until, at the present time, they are the dominating factor." Mr. Nichols pointed out the interesting fact that electricity is substantially the only commodity produced on a large scale that must be consumed the instant it is produced. For this reason the load factor is of paramount importance, and overhead—taking account of the enormous plant that must be maintained to insure current production when and as wanted—becomes the largest element in the compilation of current costs.

CO-OPERATION BETWEEN CENTRAL HEATING COMPANIES AND OIL HEATING INDUSTRY

"Central stations," Mr. Nichols said, "are looking ahead for loads to supplement the lighting load in homes. This, to a certain extent, has been effected through the use of irons, fans, and, on larger scale, by electrical refrigeration equipment." He then cited the outstanding case of one large public utility that had actively taken up the sale of oil burners and apparently had been successful in this field.

"Some of the public utilities," said Mr. Nichols, "are combination companies, producing both gas and electricity, and here there is an apparent conflict where the electrical department may be working to sell an oil burner and the gas department trying to install a gas-fired boiler." He spoke of the experience of the Edison Illuminating Company's committees assigned to survey the oil-burner industry and to report on the desirability of closer co-operation, for mutual advantage. He told of a two-year period during which the utilities companies tested household refrigeration equipment before assuming responsibility for pushing the sale of this mechanism. At the present time there are more than half a million refrigerators in use in the country. "If the demand for oil burning is as satisfactory as we believe it is," said Mr. Nichols, in conclusion, "you will receive a very warm welcome from the ranks of the public utility companies supplying electricity."

APPLYING OIL BURNERS TO WARM-AIR

"A year ago," said President Jacobs, "we had two powerful industries arrayed against us—the coal interests and the gas people. To-day we have two powerful allies, the public utilities and the heating industry. As our association extends its scope of activities so that we work with overlapping industries, we may be sure that our business will greatly be strengthened."

He then introduced R. W. Stockwell, representing the National Warm-Air Heating and Ventilating Association. Mr. Stockwell showed that he had a comprehensive grasp of the situation when he opened his talk on oil burning in warm-air furnaces by admitting that the subject was one for argument in both industries, and that the warm-air furnace manufacturers knew very little about oil burning, and oil-burner manufacturers even less about the warm-air furnaces. He briefly outlined the prin-

cipal sources of trouble in these installations, pointing out that, while in a boiler, the heating surface was backed with water which carried the heat away rapidly and prevented the surface rising above a definite temperature, in a warm-air furnace, it usually was possible for the oil burner to produce excessive temperatures in the air-backed metal and cause rapid deterioration or even the ruin of the furnace.

Mr. Stockwell spoke of the research work that has been carried on at the University of Illinois and of the adoption, by the warm-air furnace manufacturers, of a uniform rating code. This code, he explained, rated the furnaces in square inches of duct section. Under no circumstances, he stated, should oil burners be installed in old furnaces with cement joints; rather the furnace should be completely torn down and rebuilt with thoroughly cleaned, carefully cemented joints. Mr. Stockwell spoke of the importance of drying out the cement very slowly, as rapid hardening, under heat, causes the cement to become extremely porous. He was emphatic in stating that warm-air furnaces invariably were designed for application of heat at grate level and said that burners should not be installed in the ash-pit unless special precautions were taken to prevent the heat from entering the air intake, heating the incoming cold air and choking the draft.

FURNACES WILL BE DESIGNED FOR OIL FUEL

Mr. Stockwell said he looked for furnaces designed specifically for oil burning and said that such a furnace should have a large combustion space, long gas-travel and baffles in the secondary passages to prevent stratification. The hottest part, he said, should be the top of the furnace. The air passages should be small and it should be possible to maintain flue temperatures of 400° F. or less. Such a furnace should show 80% efficiency and the installation could be put in for two-thirds of the cost of an equivalent hot-water job.

This paper provoked considerable discussion, led by C. H. Chalmers who asked for more details in regard to bricking and baffling. Mr. Stockwell repeated the reasons for bricking and baffling and outlined the principles of application to different types of furnaces. In reply to a question by M. E. Simpson as to the difficulties experienced where heat was allowed to penetrate to the cold-air intake, Mr. Stockwell said that baffles furnished a solution in each case but that air flow always could be controlled by the use of a small fan.

A. S. Armagnac asked if anything were being done by furnace manufacturers to reduce vibration due to combustion. Mr. Stockwell's retort was that the only solution to this problem will be the building of quiet burners. Another question was put regarding the control connection to an auxiliary fan, and Mr. Stockwell outlined the operation of such a fan, saying that the fan should always have an angle of lag over the burner, starting a considerable time after the burner, as otherwise it would blow cold air through the house every time the burner was operated. Each case, he said, was an individual one, but it made no difference in the solution if the underlying principles were understood.

Secretary L. D. Becker then called attention to the outstanding features of the program, both for the convention and for the entertainment of the visiting ladies.

DEAN ANDERSON DELIGHTS WITH CHARACTERISTIC TALK

Speaking on the subject "Robots Burning the Midnight Oil," F. Paul Anderson, dean of the College of Engineering, University of Kentucky, and past-president of the American Society of Heating and Ventilating Engineers, launched into a delightful recitation of the characteristics of American enterprise and the development of machines with human faculties. He told an interesting story of an outstanding robot, the notable one in the Coast and Geodetic Survey in Washington, which would, in less than an hour, compute tidal conditions in any part of the world at any date, past or future. The manual working of this problem would require two weeks of time.

Dean Anderson told an interesting story of how this machine literally turned its focus on the historic ride of Paul Revere and conclusively proved that the popular verse commemorating this historic event was based on tidal conditions that did not exist, so that in this case, the robot proved the historian to have been in error. He then naturally brought the conclusion of his talk to the robot of the oil-burner industry, the superhuman machine that automatically maintains uniform heating in the home throughout the heating season.

The concluding feature of the meeting was an address by Darwin J. Meserole, a Brooklyn attorney, who described his experiences after having installed an oil burner in his home. He characterized himself as an "nth degree oil-burner fan" and said that, in his opinion, the oil burner has done more to promote human happiness in the home than anything that has come out of the past.

The session then adjourned.

ANNUAL MEETING

The annual business meeting of the association convened at 5:00 P.M. in the south ballroom, the important business transaction consisting of the passage of a resolution for the incorporation of the association, the passing of a number of proposed amendments that previously had been circulated among the members and passed by the board of directors, and the election of directors to replace those retiring at the expiration of their three-year term. Reporting for the nominating committee, C. H. Chalmers stated that it was the unanimous view of the committee that the retiring directors should be elected *in toto*. No other nomination having been made, these directors were unanimously elected.

Standards of trade practice and proposed oil specifications were then briefly discussed and unanimously adopted. Reports were heard from the committee on relations with the heating industry and the committee on patents, following which the meeting adjourned.

Morning Session, April 4

Meetings of the board of governors of the dealer division and of the board of directors of the association, occupied the morning for the executives. The exposition hall was open from 9 o'clock until 12 o'clock for the every-day members.

Afternoon Session, April 4

MANUFACTURERS' SESSION

Having for its general subject "Engineering" the meeting was opened by Chairman W. C. McTarnahan, president of the Petroleum Heat and Power Company, who outlined the progress of the past and possibilities of the future in oil-burner development.

Han Kunitz told of progress being made in fundamental engineering in the oil-burner industry, and said that much research was necessary before many of the problems now baffling oil-burner designers could be solved.

Discussing "What Competition May We Expect From Other Fuels?" A. E. McInnis, president of Preferred Oil Burners, Inc., emphasized the fact that the public, through stock ownership in public utilities, is fundamentally interested in gas companies. Gas, according to Mr. McInnis, is the only real competitor of oil for domestic heating, and he expressed his opinion that if the oil-burner industry concentrated on selling oil heat to the American public, it could create a tremendous market for oil burners and accessories before the gas companies, more sluggish in turning toward something new, could enter the picture in a large way.

"The Importance of Accessory Equipment in Oil-Burner Design and Installation," by George W. Kingsland, manager, Minneapolis-Honeywell Regulator Company, developed thoughts entirely new to many who have been in the oil-burner industry for years. Mr. Kingsland said in part:

"It is difficult to distinguish between that which is pertinent to, and that which is accessory to, an oil burner. The accessory of yesterday, having proved its value by increasing efficiency, economy of production or installation, promptly becomes the necessity of today.

"Does it not, therefore, behoove the manufacturer to select carefully each and every item which goes to make a part of his burner and installation?

New Officers and Directors of the A. O. B. A.

At a meeting of the board of directors, held on Thursday, the following officers and directors were elected:

Officers: President, J. C. Johnson, president, S. T. Johnson Co., Oakland Cal.; chairman of the board, Edward P. Bailey, president, National Airoil Burner Co., Philadelphia. Regional vice-presidents are: Walter F. Tant, president, Silent Automatic Corp., Detroit, Mich.; George P. Kittle, president, Airoil Burner Co., Union City, N. J.; E. M. Fleischmann, president, May Oil Burner Corp., Baltimore, Md.; M. E. Simpson, vice-president, Electrol Distributing Corp., New York; George Bulloch, president, Caloroil Burner Corp., New York, and managing director, Leod D. Becker, New York.

Directors: I. M. Nelson, vice-president, Sword and Kimber Co., Philadelphia; E. A. Weil, secretary-treasurer, Automatic Burner Corp., Chicago; W. C. McTarnahan, president, Petroleum Heat and Power Co., New York; Morgan J. Hammers, president American Nokol Co., Chicago; C. H. Chalmers, general manager, Chalmers Oil Burner Co., Minneapolis, Minn.; Franklin Hardinge, president, Hardinge Bros., Chicago; W. T. Koken, president, Electrol Inc. of Missouri, St. Louis, Mo.; Edward Blake, general manager, Super Oil Heator Co., Pawtucket, R. I.; W. F. Schroeder, president, Schroeder and Curry, St. Louis; J. S. Coonley, Jr., vice-president, Winslow Boiler & Engineering Co., Chicago; W. R. Ray, president, W. S. Ray Mfg. Co., San Francisco, Cal.; H. Finnie, general manager, Timken-Detroit Co., Detroit; R. S. Bohn, president Preferred Utilities Co., New York; W. Schwan, president, Gillespie and Schwan, Inc., Dallas, Tex.; John W. Scott, president, Buckley and Scott, Inc., Boston, Mass.; C. E. Campbell, general manager, The Nu-Way Corp., Rock Island, Ill.; Lionel L. Jacobs, vice-president, Electrol Inc., of Missouri, St. Louis; Oliver D. Ward, W. W. Ward and Son, Rutland, Vt.; A. E. McInnis, president, Preferred Oil Burners, Inc., Peoria, Ill.

The directors also announced the following committees for the coming year: Executive committee, J. C. Johnson; committee on research, Harry F. Tapp; committee on general trade practice, E. M. Fleischmann; membership committee, dealer division, R. S. Bohn; committee on corporation with underwriters' laboratories, L. H. Van Ness; committee on patents, C. H. Chalmers; committee on co-operation with heating industries, P. E. Fansler; committee on finance and budgets, Walter F. Tant; constitutional committee, E. P. Bailey; membership committee, manufacturing division, A. E. McInnis; committee on electric motor specifications, C. H. Chalmers; committee on uniform ordinances, Walter F. Tant; committee on uniform oil specifications, Harry P. Tapp; committee on design and installation standards, H. Finnie; committee on market research, Lionel Jacobs.

Burner and accessories must work in harmony; units must be selected that not only will do their job, but which, through their quality and design, will assist other units in doing theirs.

"The problem of the installer must not be ignored by the manufacturer; each unit must carefully be weighed from the viewpoint of the men in the field. If there are two pieces of equipment which compare favorably in the laboratory, the one which lends itself more readily to installation and servicing should be chosen; for remember, that no burner is better than the man who installs it, and the manufacturer who makes it easy for the installer has taken a long step towards a satisfied user, and towards success.

"My intimate knowledge is of temperature control, and so I will endeavor to outline a few recent developments in temperature control in the belief that those points which have bearing on the final success of the burner in the field are of vital interest to the manufacturer and his engineers.

"In New England there has been much complaint, where automatic fuel is used, of what is termed 'cold 70.' By this is meant that condition of a room when, with thermometers at eye height registering 70°, the air near the windows and floor is sufficiently cool to create a feeling of chill. The cause of this 'cold 70,' where steam or water heats the home, is the fact that the radiators frequently become stone cold, and thus the circulating impulse is lost and the air stratifies, and as the family sits near the window, this 'cold 70' is particularly noticeable and annoying.

"Another factor that aggravates the situation is the habit of many people, especially women, when coming indoors in cold weather, of drawing close to and placing their hands on the radiator to get warm, and when the radiator is cold, they immediately feel cold, even though the room is 70° or above.

"We have overcome complaints of this nature by the use of an additional thermostat. In hot water this thermostat —limit control—is mounted on, or in a riser, and is so wired that when the water temperature drops to 90° (circulation in most plants can be maintained at 90°) the burner is turned on until the temperature is brought to 90°, and is then turned off, irrespective of the room thermostat. This minimum, of course, can be varied to meet requirements, and in some cases, it has been found advisable to run it as high as 110°, or even 120° during extreme weather. This second, or low temperature, control can be entirely thrown out when the owner wishes.

"In a steam or vapor plant, a thermostat is mounted on a radiator and set to turn on the burner when the radiator chills.

"According to reports, this not only serves to increase the comfort and satisfaction of the owner, but is actually an economy, if the owner will adjust the instrument once or twice during the season. This 'cold 70' condition is not as noticeable when the operating range of the room thermostat is kept to one degree. It is very noticeable when the operating range is above two degrees.

"In duplex (two-family) buildings, the dissatisfaction of a tenant of one apartment being under-heated—and it is generally the second floor, where the exposed roof surface causes undue heat loss, especially on cloudy days—can be overcome by placing a thermostat in each apartment, so wired that either thermostat calling for heat can start the burner, and the last one satisfied, turns it off. But, better still, is to so arrange the piping (this can be done very readily in new buildings and frequently old buildings can be inexpensively adapted to the change) that each apartment operates as an independent circulating unit. Install a heat regulator in each apartment to operate a steam valve governing the flow of steam to that particular suite. Then, through proper wiring, connect both so that either one calling for heat will throw the burner into operating under boiler control. The burner will continue to operate under boiler control until both are satisfied, when the burner will be automatically taken from the command of the boiler control and closed down. Thus, full comfort is given. No overheating, no underheating. Therefore, satisfied tenants, and what is decidedly interesting, a minimum expense for fuel."

W. G. Thomas, representing the Copper and Brass Research Association, told of the interest his organization had in the oil-burner industry, and said that the technical information in its files and the advice of its metallurgists and engineers were at the disposal of oil-burner manufacturers, and that the association gladly would co-operate with manufacturers in solving problems relating to the use or technology of copper, brass or bronze in their applications to oil burners.

Edward R. Alexander, a patent attorney of note, spoke on "Patents in Relation to Merchandising." Mr. Alexander told of the organization of the patent office, under Thomas Jefferson

as Secretary of State in 1792, and said that Jefferson had considered this project so important that he personally sat as the first patent commissioner. Sketching the functioning of the patent office, through its long period of existence, Mr. Alexander told of the applications of Fulton, Stevenson and Bessemer, each a pioneer in his field, then of the Civil War, following which came the era of agricultural implements, with many patents. Following which came a period of standardization, and in 1893, the beginning of a period of mergers.

One of the most important products of this period developed into the cross-licensing agreement, as is well exemplified by the arrangement of the great electrical manufacturers for interchange of patents. Citing the chaos in the early days of the automotive industry, as a horrible example to oil-burner manufacturers, Mr. Alexander said that the automobile manufacturers started out in defiance of patents and, just previous to the great war, the condition had become so complex that the industry found it of vital importance to develop a cross-licensing arrangement. This was completed in 1916, and functioned with general satisfaction for ten years. Mr. Alexander told of how the radio and aircraft industries are adopting this idea and suggested that it might well be a solution for the present unsatisfactory situation in the oil-burner industry.

After a spirited discussion, indicating keen interest in this subject, the meeting adjourned.

DEALERS' SESSION

Under the general subject of "Sales," the dealers, at their Wednesday afternoon session, discussed such subjects as dealer problems, organizing a sales force and the opportunities for expanding the dealer's activities through the sale of indirect heaters for heating domestic water.

The chairman of the session was Oliver W. Ward, of W. W. Ward & Sons. Earl Newson, of the Oil Heating Institute, presented the results of a survey made last year by the institute relating to the operation of domestic oil burners. One of the principal objections, he said, cited by owners, was that the burners were too noisy; whereas, in 1926, 33-1/3% of the replies to a questionnaire gave "noisiness" as an objection, this percentage was reduced to 13% in 1927. The expense of the oil burner was also mentioned as a principal objection, but here again, whereas in 1926 the percentage came to 25, in 1927 it had dropped to 22.

Speaking on "The Relation of the Indirect Heater to Oil Burners for the Heating of Domestic Water," R. E. Moore, manager of Bell & Gossett Company, Chicago, presented some interesting data on the use of these heaters, especially in connection with public garages, restaurants and golf clubs. The data included some test figures showing a decided economy in the use of oil over gas for this purpose; with regard to golf clubs the use of indirect heaters, he said, had eliminated entirely the separately-fired tank. Such an arrangement is especially adapted for summer operation because it is not necessary to raise the pressure in the boiler.

The attachment of indirect heaters to boilers, said Mr. Moore, has the effect of increasing the circulation in the boiler and decreasing the stack loss; again, where the boiler is being operated entirely for heating water, it is possible to raise the water-line and decrease the steam space so that the water can circulate through the upper portions of the boiler.

SIMPLE RULE FOR DETERMINING EQUIVALENT RADIATION LOAD FOR INDIRECT WATER HEATING

In calculating the heating load where an indirect heater is attached to the boiler, Mr. Moore gave a handy rule-of-thumb, namely: for each gallon of heater capacity, add ½ sq. ft. of radiation. In estimating the size of the heater itself, he cautioned his hearers to base the size on the requirements and not on the size of the storage tank.

Frank T. Harbin, president of the Automatic Heating Corp., Washington, D. C., told of the methods he had used with success in conducting a dealer's agency. All of his men, he said, were on a straight commission basis. A method he has used with success to augment sales is an inter-office contest and he told in detail of such a contest conducted by his Baltimore and Washington offices. He had found it profitable to handle both a domestic type and an industrial type of burner. In discussing the matter of service, Mr. Harbin said he figured the cost of service to be 4% of the sales price. He had been able to keep down service expense by offering his men a bonus for reducing the number of calls.

Mr. Harbin told of the Advisory Service Department established in Washington by a number of oil-burner dealers, and he felt that half of the problems of oil-burner selling would be solved by the establishment of a good local association. Another important need, he said, was a good accounting system. One of the achievements of the Washington Local Dealers' Association was the bringing together of no less than 81 architects at a dinner given by the association at the close of one of its exhibitions. This, he said, was an achievement which would not have been possible were the dealers not organized.

One of the propositions immediately before the association, he said, is the adoption of a standard form of contract.

Organizing a sales force was discussed by Williard W. Howe, president of Willard W. Howe Co., Kansas City, while W. O. Harvey, president of Harvey-Whipple Co., Springfield, Mass., spoke on "Selling Oil Heating Service Instead of Oil Burners."

ANNUAL BANQUET, WEDNESDAY EVENING

More than four hundred gathered in the grand ballroom for the annual banquet, presided over by President Jacobs.

Following the presentation by E. P. Bailey, chairman of the board, of an association emblem to President Jacobs, the guest speaker, Edward James Cattell, of Philadelphia, was introduced. Mr. Cattell launched into one of the characteristic talks, for which he is famous, and delighted his audience with his philosophy and wit.

Following this address there was dancing and a general "party."

Morning Session, April 5

Meetings of the board of directors and of the councilors of the Oil Heating Institute were held in the morning, as well as the manufacturers' session in the south ballroom, and the dealers' session in the north ballroom.

MANUFACTURERS' SESSION

At the Manufacturers' Session, held Thursday morning, the entire meeting was devoted to organization and management. Following opening remarks by the chairman, H. Finnie, general manager of The Timken Detroit Company, Albert J. Fleischmann, treasurer of the May Oil Burner Corporation, discussed the subject of "Time Payments and Their Relation to Retail Oil-Burner Sales." R. S. Beale, national sales director of Electrol Inc. of Missouri, spoke on "Why We Have General Trade Practices."

In discussing the selection and training of dealers C. H. Rittenhouse, director of sales of the Caloroil Burner Corporation, offered, as the principal qualifications of a dealer, high reputation; financial responsibility; knowledge of heating, sales ability; and organization ability. He also must have a knowledge of competing products.

Mr. Rittenhouse emphasized the importance of manufacturers knowing how to retail oil burners. "We must be able," he said, "to show a dealer how to make sales." Distribution, he declared, is the cornerstone of the manufacturers' program. He looked forward to the time when domestic oil burners will become staple. It is incumbent upon the manufacturers to develop better dealers.

In the ensuing discussion a remark by Mr. Fleischmann, that a definite service period is needed, led to an interesting discussion, the point being made by one speaker that he had built up his own reputation as a dealer by being always ready to service every one of his installations.

DEALERS' SESSION

The dealers' session was called to order by Chairman William C. Groff, president, Kleen-Heet Sales Company, who stated that the subject of the meeting was "Installation and Service."

Fifth Annual Banquet of American Oil Burner Association, Hotel Stevens, Chicago, April 4, 1928

W. W. Stuart spoke on "CO_2 and Its Relation to Burner Adjustment." Mr. Stuart told of the desirability of making Orsat tests to determine burner performance, and to secure for the customer the highest practical working efficiency. The talk provoked extended discussion and it was evident that there were many opinions in relation to the index value of CO_2.

"The Part Oil Burners Play in Smoke Abatement" was discussed by W. F. Schroeder, who told of great advances in cleanliness made in soft-coal burning regions through the introduction of oil as a fuel.

The meeting closed with an enthusiastic talk by C. W. Farrar on "Selling Home Comforts." Mr. Farrar, who is well known as a high-pressure sales executive, developed basic principles of sales psychology in merchandising equipment for increasing living comfort. This provoked a lively discussion, following which the meeting adjourned.

The exposition hall was open Thursday afternoon and evening untill 11 o'clock and was even more crowded than it had been during the previous days.

ENTERTAINMENT

The beautiful ballroom of the hotel was the scene, on Tuesday evening, of an entertainment, dance and buffet supper, staged by the Chicago Oil Burner Association under the leadership of J. W. Owens, chairman of the convention arrangement committee, and Cliff W. Presdee, vice-chairman. Nearly two thousand delegates and their friends and guests gathered for the evening's entertainment, which included special numbers by leading members of theatrical organizations playing in Chicago. These performances were outstanding in character and the assembly, as a whole, got more than one kick out of Hank-the-Mule. This highly trained animal, capering with incredible grotesqueness, after pulling many uproarous stunts with individual guests, was disclosed as a very tired, but appreciative young woman. Dancing prevailed until the small hours of the morning, and at midnight an elaborate buffet supper was served.

Wives of prominent members of the Chicago Oil Burner Association formed a committee to provide entertainment for visiting ladies, and an elaborate program was carried out. On Tuesday a bridge party was held in the north ballroom, the winners receiving attractive prizes. On Wednesday groups were taken to four of the leading theaters, and on Thursday an automobile trip over Chicago's famous boulevard system was made under official escort. The ladies stopped for luncheon at the South Shore Country Club, and spent the afternoon playing bridge; several beautiful prizes were carried home by the more skillful—or lucky players. While the sight-seeing tour was abroad, a matinee party was taken to see "Good News."

Exhibits

NEARLY 75 manufacturers of oil burners and accessories occupied booths in the exhibition hall. Although the exhibits were closed to the general public, admission being granted to delegates with badges, the hall was crowded at all times. Among the notable exhibits were the following:

American Nokol Co., Chicago, exhibiting a complete line of Nokol and Aetna burners. There was also shown the new rotary-type Nokol. Those representing the company were: Morgan J. Hammers, president; A. B. Frenier, vice-president; John Scheminger, vice-president; W. A. Kemp, assistant general manager; C. E. Shields, factory and production manager; J. E. Terhune, L. O. Roberts, G. W. Graves, S. E. Thompson, W. A. Bulger and H. R. Holbrook.

Automatic Burner Corp., Chicago, exhibited, in a well-planned setting, the A B C burners, both assembled and taken down to show the elements of construction. Those present were: Milton Hirsch, sales manager; Stanley Perry, assistant chief engineer, and E. H. Haupt, advertising manager.

Bettendorf Oil Burner Co., Bettendorf, Iowa, exhibited several models of the Bettendorf burner. Representing the company were: W. H. Martin, secretary and general manager; R. Lee, sales manager; John Hansen, factory superintendent, and R. Moritz, director of advertising.

Breese Engineering Co., Chicago, had an interesting display of auotmatic damper regulators, with draft gauges to show their sensitiveness. The company was represented by F. M. Bennett and M. H. Cotes.

Bryan Steam Corp., Peru, Ind., exhibited a cut-away oil-burning boiler with detailed parts showing the outstanding features of design and construction. With George A. Bryan, president of the company, were: George T. Wright, R. G. Garretson, E. T. Payne, J. A. Davis, W. M. Burroff, F. M. Lesh, F. L. Lusher, C. C. George, F. D. Miller and F. A. Allen.

Century Electric Co., St. Louis, Mo., exhibited a complete line of electric motors for use on domestic and industrial oil burners, including single phase, repulsion-start and split phase, polyphase, squirrel-cage and direct-current motors. Representatives of the company were: H. A. Porter, T. Elder, C. O. Hedges, G. H. Hodgkiss, H. L. Madsen, A. E. Schmitt and H. J. Paul.

Combustion Fuel Oil Burner Co., Milwaukee, Wis., had on display several industrial and domestic type burners. A new feature shown was a twin cross-fired nozzle equipment for large round and shallow boilers. Representing the company were: John R. Ball, president, H. S. Rogers, vice-president, and W. H. Rue, eastern manager.

Commonwealth Engineering Co., Chicago, exhibited a cut-away automatic oil burner, installed in a 1000-ft. Orr & Sembower boiler. With C. H. Foulds, general manager, was Willard E. D. Long representing the company.

Cook Electric Co., Chicago, had an elaborate exhibit of fuel-oil pumps, burner pumps, oil-burner controllers, fuel-oil gauges, and other accessories. Of special interest was the H Junior automatic fuel-oil pump with its improved valves and larger tank. In the booth with George R. Folds, president, were: L. M. Persons, John F. Jaap, E. D. Swanberg, D. C. McKee and A. M. Wilkins.

Dongan Electric Mfg. Co., Detroit, Mich., exhibited ignition transformers and radio-interference eliminator-condensers. Those in attendance were: G. J. Scherling, secretary and treasurer; C. Sam Swanson, sales manager; R. L. Osborne and C. Ringwald.

Economy Heat Unit Co., Minneapolis, Minn., exhibited an In-the-door burner and a Roto Flame burner, together with an automatic oil pump. Representatives were: L. H. Fawkes, president, and C. M. Stroud, vice-president.

Eisler Engineering Co., Newark, N. J., showed three sizes of Eisler automatic oil burners, a Junior, domestic and industrial. Representing the company were: Charles Eisler and Michael Fox.

Enterprise Oil Burner Co., San Francisco, Cal., exhibited Enterprise Rotary burners for domestic, commercial and industrial use, capable of taking care of anything from a small bungalow to a skyscraper. Representing the company were: H. Barley, David S. Cruisckshank and J. A. Alliotts.

General Electric Co., Schenectady, N.Y., displayed motors, capacitors for elimination of radio interference and ignition transformers. In attendance were: W. H. Henry, G. G. Jeter, F. M. Osborn, D. W. Merchant, T. B. Ellis, A. W. Bartling, H. T. Lange, R. A. Beveridge, T. H. Reeves, D. O. Brooks, F. W. Somers, C. D. Albright, J. Rowe, Elliott Harrington and A. W. Hollister.

Frank A. Holby Corp., New York, showed a complete line of Holby industrial oil-burning equipment, combination pump and fan sets, also air registers, galley range burners and automatic electric heaters. Worrell H. Holby, vice-president, and John T. McTarnahan, chief engineer, represented the company.

Jefferson Electric Mfg. Co., Chicago, exhibited the new Jefferson universal transformer for electric ignition. Representatives were Messrs. Daley, Goddard, Sola, Johnson and Kob.

K-W Ignition Corp., Cleveland, showed the type O B and the type O C oil-burning ignition transformers, and was represented by R. J. Eiseman and A. G. Karkan.

Lassen & Bissell, Inc., Hartford, Conn., showed a model A vertical-cup atomizing oil burner. With Grover V. Lassen, president, was George Bissell, general sales manager, and E. Field White, engineer.

May Oil Burner Corp., Baltimore, displayed the three sizes of Quiet May burners and featured a display of sales literature. Representing the company were: E. M. Fleischmann, president; A. J. Fleischmann, treasurer; Henry D. Schmidt, R. E. Van Norstrand and E. S. Jeffries.

McAlear Mfg. Co., Chicago, exhibited a complete line of combustion water-feeders and controllers equipped with and without low water and pressure cut-out switches and a complete line of steam specialties. Representing the company were: W. P. Nevens, W. Ludirk and M. Mannion.

McIlvaine Burner Corp., Chicago, exhibited the type A burner, mounted through the front section of a Weil-McLain sectional boiler. Also there was shown a display board on which were fastened the principal parts of the burner. Representing the company were: G. H. Bennethum, W. C. Smidler, F. W. Gatter, R. H. Duthie, T. J. Cady, J. A. Adamson and J. H. McIlvaine.

Meyers Fuel Saver Co., Inc., Janesville, Wis., exhibited a device for saving heat from flue gases.

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., exhibited an extensive line of Minneapolis and Honeywell control systems and auxiliary control equipment. Those present were: M. C. Honeywell, president; H. W. Sweatt, vice-president and general manager; C. B. Sweatt, A. P. Mudgett, A. H. Lockrae, P. F. Shivers, L. W. Cunningham, Ben Boatt, J. W. Pauling, G. S. Meikle and D. J. Peterson.

The Nu-Way Corp., Rock Island, Ill., exhibited nine sizes of burners including three sizes of the pressure-atomizing type. With M. H. Braden, vice-president, were C. A. Campbell, J. E. Walsh, W. F. Klockan.

Petroleum Heat and Power Co., New York, exhibited Petro domestic and industrial mechanical-atomizing, air-turbine burners. The domestic sizes ranged in capacity from 1 to 45 gal. per hour, automatically operated, and the industrial sizes rated up to 1000 H.P. With W. C. McTarnahan, president, were C. P. Packard, assistant chief engineer, and E. L. Merica, divisional manager.

Preferred Oil Burners, Inc., Peoria, Ill., exhibited a number of models of Hart oil burners, and was represented by A. E. MacInnis, president; R. S. Bohn, vice-president; Spencer A. Merrell, vice-president; Lloyd J. Aldrich, chief engineer; F. G. Cowan, assistant general manager; F. D. Chamberlin, advertising and sales promotion manager; F. E. Heighway, assistant advertising manager; W. A. Matheson, assistant sales manager; J. G. Dierkes, manager Chicago division; E. H. Whitaker and A. D. Brooks, sales representatives; Arnold White, assistant engineer, and D. O. Wolfred, production manager.

Teesdale Mfg. Co., Grand Rapids, Mich., showed a sectional model of the automatic type T U wall pump set up to illustrate its quiet operation, and several other highly specialized devices.

Titeflex Metal Hose Co., Newark, N. J., had an interesting exhibit showing the ability of the type O.B. all-metal flexible tubing to resist vibration. The company was represented by E. A. Husted, Ives Calhoun and James E. Grant.

Tuthill Pump Co., Chicago, exhibited a complete line of pumps for the oil-burner industry. This is an internal-gear type pump with a packingless driveshaft, making it possible to produce high pressures without leaks and with uniform power consumption. Representatives of the company were: Gray B. Tuthill, secretary; O. L. Bock, sales engineer; H. E. Kempton, manager, and H. C. Osborne, chief engineer.

Viking Pump Co., Cedar Falls, Iowa, exhibited the new Viking fuel-oil pump and standard motor-driven models. C. W. Dennis and J. A. Linden represented the company.

Wagner Electric Corp., St. Louis, showed a line of repulsion-induction and split-phase motors, and was represented by E. A. Forkner, E. W. Webber, R. M. Sharp, George Edscom, V. M. Holmes, James B. Holston, George Nelson and R. B. Barber.

Webster Electric Co., Racine, Wis., showed Webster ignition specialties and was represented by A. Arthur Lore, president; E. M. Ford, sales manager; Arthur M. Kluckner, vice-president; Vayle Ott, chief engineer; C. Hagan, engineer; P. G. Crewe, secretary and treasurer, and C. T. Hamett.

Westinghouse Electric & Mfg. Co., Pittsburgh, exhibited circuit-breakers, safety switches and single-phase motors, also a small portable frequency-changer set motor.

Winslow Boiler & Engineering Co., Chicago, exhibited a Kleen-Heet type 800 and a Kleen-Heet type "GJ" burner as well as a Winslow industrial burner. The exhibit was in charge of H. M. Wallis and L. P. Arms.

Canadian Oil Association Meets in Chicago

Taking advantage of the convention, the Canadian Oil Heating Association met on the afternoon of April 5, and in the absence of president L. L. Jacobs, vice-president E. D. Rank, called the meeting to order. After the preliminary business was attended to, Mr. Rank spoke particularly of the benefits to prospective members, on the aims and objects of the association and appealed for a larger membership. Details of the organization were freely discussed. The proposed code of business ethics was read and provoked considerable discussion. The meeting adjourned to reconvene in Toronto, May 7.

Chicago Oil Burner Association

The April meeting of the Chicago Oil Burner Association at the Allerton Club on April 10, attracted sixty members and guests.

A discussion centered upon a project which provided that the association employ an engineer to inspect the installations of each member, the cost of this service to be paid for by a fee levied on the vendor. The plan provides, where the inspector certifies that the installation in its entirety is strictly in accordance with installation standards set up by the association, that a stamp of approval be placed upon the job. Another suggestion, made by E. W. Miles, provided that a standard sign be placed on every building where a new burner was being installed, the sign to state that the building was to be heated with oil, and to bear the name of the member and the symbol of the Chicago Oil Burner Association, Incorporated.

A conference committee was appointed, one representative being selected from each group represented in the association, this committee constituting a point of contact between the various groups and the board of directors of the association. E. W. Miles was chosen to represent the oil companies; J. R. Kenney, the installation companies; R. R. Schurig, the tank manufacturers; J. W. Owens, accessory manufacturers, and Homer Linn, boiler manufacturers.

J. P. Baldwin, a member of the Chicago Master Steamfitters Association, and a heating contractor of large experience with oil heating, was the guest of the association and spoke on "The Heating and Oil-Burner Business."

Sixty-three members and guests of the Chicago Oil Burner Association gathered at the Allerton Club, Chicago, March 20, for the annual meeting. Four new members were elected. J. M. Owens of the convention's Arrangement Committee, reported on the program in connection with the American Oil Burner Association's convention which report was supplemented by one from the vice-chairman, C. W. Presdee.

Lyle Straight, president of the association, outlined the activities and accomplishments of the organization during the past year. He also called attention to the fact that the association had become affiliated with the Chicago Association of Commerce and that the membership and ordinance book had been published and given a wide distribution. He also stated that membership had increased almost fifty percent during the year.

C. W. Presdee, secretary, then outlined the operation of the association headquarters and stated that in addition to instigating an employment service for members, he was handling all mail, telephone and personal inquiries for service on orphan burners from the association

headquarters. He also outlined the activities of the board of directors during the past summer in eliminating highly undesirable trade practices that have become prevalent in Chicago territory.

William B. Gemmill, candidate for municipal court judge, delivered an interesting address on Interesting Cases that had come before him for trial.

F. W. Staples, for the Nominating Committee, submitted recommendations for officers for the coming year and by acclamation the following were elected: President, Lyle Straight; vice-president, C. H. Foulds; secretary-treasurer, C. W. Presdee; director members of the board, E. W. Miles and D. M. Durkee. T. C. Kyle, as past-president, retained his place on the board of directors.

Burning Liquid Fuel

A revision of one of the earliest books published on the subject of the application of oil fuel to industrial heating and processing is announced by the Scientific Book Corporation, 15 East 26th St., New York. This is practically a reprint of the 1922 edition.

Dr. W. N. Best, the author, is known as one of the pioneers in industrial oil burning, and, while the book leaves much to be desired in regard to the technology of combustion, the field of applications as of 1922 and earlier, is thoroughly covered. There are chapters on refractory material, locomotive equipment, stationary and marine boilers, low-pressure boilers and warm-air furnaces, commercial gas industry equipment, steel foundry practice, heat-treating furnace practice, ceramic equipment and many others, to the number of 28, dealing with specialized uses of fuel-oil equipment. The book is voluminously illustrated with photographs and drawings. Size 6 x 9. Pp. 342.

New Oil-Burner Listings by Underwriters

Recent approval by the Underwriters' Laboratories, Chicago, includes the following:

Domestic Oil Burners:

WINSLOW, mechanical draft, a-c motor drive, electric ignition and suction feed. Approved with fuel not heavier than 28° A.P.I.; manufactured by Winslow Boiler & Engineering Co., Chicago, Ill.

JOHNSON, mechanical draft, a-c. or d-c. motor drive, gas pilot, suction gravity or pump feed. Pump type approved with 28° A.P.I. oil, and gravity type with 32° oil; manufactured by S. T. Johnson Co., Oakland, Cal.

JAY, mechanical draft, a-c. motor drive, gas pilot and suction feed. Approved with oil not heavier than 28° A.P.I.; manufactured by Jay Oil Burner & Engineering Co., Philadelphia, Pa.

CENTURY, mechanical draft, a-c. motor drive, electric ignition and suction feed. Approved with fuel not heavier than 28° A.P.I.; manufactured by Century Engineering Corp., Cedar Rapids, Iowa.

S-K, mechanical draft, a-c. motor drive, gas pilot and gravity or pump feed. Approved with oil fuel not heavier than 36° A.P.I.; manufactured by S-K Oil Burner Corp., Philadelphia, Pa.

Industrial Oil Burners:

ENTERPRISE, "Type E," mechanical draft, manual temperature control and ignition and suction feed. Designed for hot water or steam installation where burners having single pumps are permitted. Fuel used should not be heavier than 18° A.P.I.; manufactured by the Enterprise Oil Burner Co., San Francisco, Cal.

Miscellaneous:

AUTOMATIC damper designed for use in heating plants in which the draft varies greatly and which are fired intermittently; manufactured by Preferred Utilities Mfg. Co., New York, N. Y.

An Unusual Scheme for Garage Ventilation

By S. C. Wilson

Bureau of Industrial Hygiene, New York State Department of Labor

EXTENSIVE study of garage ventilation has produced various types of ventilation systems for the removal of carbon monoxide gas. The usual practice is to place a disc fan in the skylight or in one of the wall windows to draw out the foul gases. While this may cause a vast improvement in the air conditions it can not be said to be the safest and surest method, as the poisonous gas can be inhaled by people who may be in the path of the fumes as they travel from point of origin to the fan. Tests made of air in garages show that carbon monoxide gas hovers near the floor. With this, and the general principles of ventilation in mind, a garage model was constructed and miniature equipment put in on the principle of floor or downward ventilation, with the object of removing the deadly monoxide directly from or near the car exhausts.

The illustration shows the exterior and part of the interior of a typical commercial garage or service station. The exhaust fan and motor are under the "show-room."

The perforated floor grates should be 20 in. to 24 in. square and be recessed so that the top is level with the floor. Under this grate a metal box about 12 in. deep should fit so as to have a 2 in. air space on all sides. In each of the four sides of this box, near the upper edge, there should be slots. A branch pipe enters the floor recess near the bottom of the box. This arrangement causes the air to be drawn through the perforations into the box, out through the slots, around the outside of the box and into the branch pipe. The box will catch dirt, oil, etc., and can easily be cleaned out. Means for starting and stopping the exhaust fan should be placed at various points in the garage in order that any employee can start the fan when the air conditions warrant and stop it when it is not needed.

The size of the system, capacity and air change depend on the size of the garage and, above all, on the number of cars running at one time. In the section where engines are tested provisions should be made to connect the exhaust pipe of the car directly to the floor exhaust box.

This ventilating system should be provided for when the building is planned, as proper channels for piping, and recesses for boxes are necessary.

Photograph of Garage Model With New Ventilation Scheme

I. M. P. A. Formulates Radiation Factors for Insulated Buildings

Method Devised by Committee of Illinois Master Plumbers' Association Divides Insulating Materials Into Three Classes, With Single Coefficient for Each Class

BY dividing building insulating materials into three general classes, namely, board, blanket and filler, or poured materials, and assigning a conductivity coefficient to each class, simplified rules for figuring radiation for insulated buildings have been developed by a committee representing the Illinois Master Plumbers' Association. They were presented at the association's annual meeting in Moline, Ill., January 24-26. Unusual importance is attached to the rules due to the personnel of the committee, which comprised such men as A. P. Kratz, professor of mechanical engineering at the University of Illinois, Homer R. Linn, engineer of the American Radiator Company, and J. D. Preble, engineer of the Public Service Company of Northern Illinois, in addition to President Charles D. Harris, Secretary Clarence A. Bolton, W. W. Hitchcock, who is chairman of the committee, and C. D. Brownell, all of the Illinois Master Plumbers' Association.

As the committee states, "It generally was agreed that the coefficient for determining the amount of radiation required should be in the form of a divisor so that the heating contractor could proceed along the line that the great number perhaps had been accustomed to instead of the B.T.U. basis. It would be noted, however, by referring to the sketches that the coefficient U is also given which is the B.T.U. loss per square foot per hour per degree difference in temperature. Thus, in all cases, the heat loss in B.T.U. is the basis of calculation."

After recounting the splendid co-operation received from the insulation manufacturers, the report continues, "We finally concluded to classify the materials into three classes: First, the board materials, second, the blanket materials, and third, filler or poured materials.

"It also was apparent that it obviously would be impossible to give a separate coefficient for each different form of construction and so, for the present at least, we selected only the most popular methods of residence construction and applied our calculations to these."

At a later date it is planned to extend the data to include such construction as is used in public buildings. In using the present data the committee offers a word of caution with respect to the elimination of all possible air currents, caulking around doors and windows, protection against ceiling and floor exposures, and damage to materials during and after erection. The calculations as presented are based on good construction.

Directions For Use of Tables

STEAM

To calculate the square feet of steam radiation required with an indoor temperature of 70° F., an outdoor temperature of 0° F., and one air change per hour occurring in the room (for other conditions see Notes A, B and C):

(1) Divide the square feet of net exposed wall by the factor *Steam, F.*, taken from the table of walls.

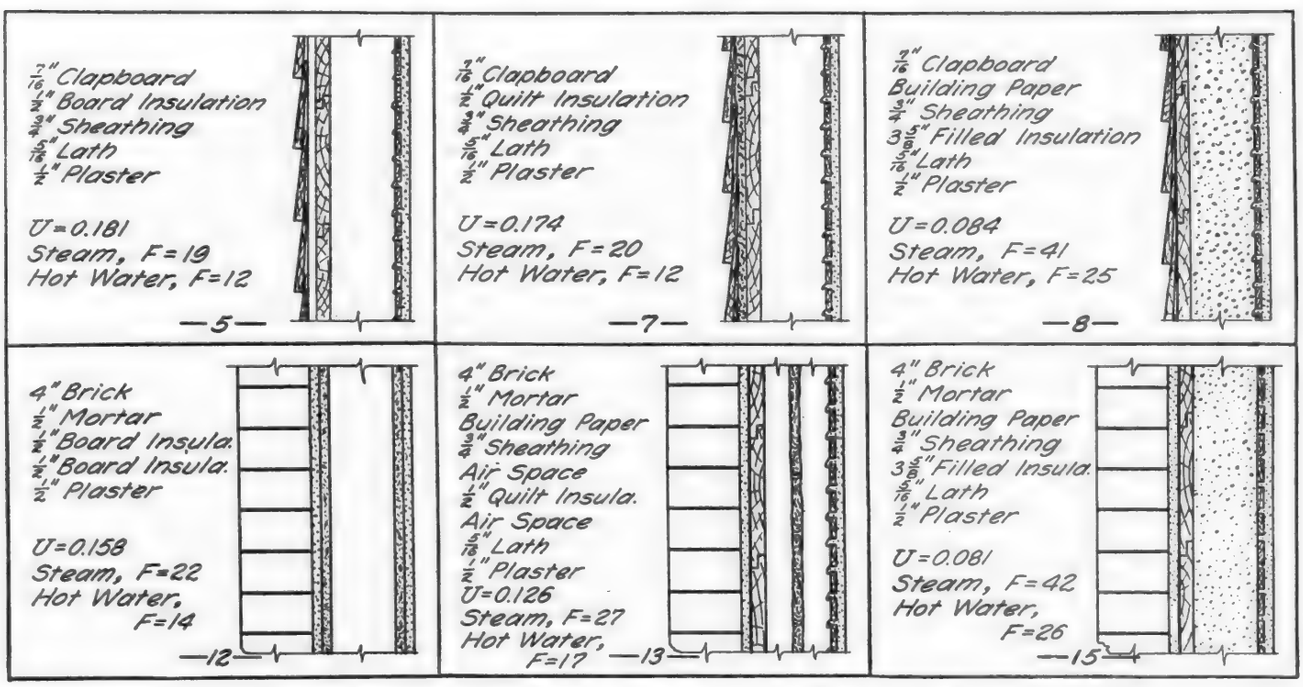
(2) Divide the square feet of cold ceiling or floor by the factor *Steam, F.*, taken from the table of ceilings or floors.

(3) Divide the square feet of single glass by 2.8.

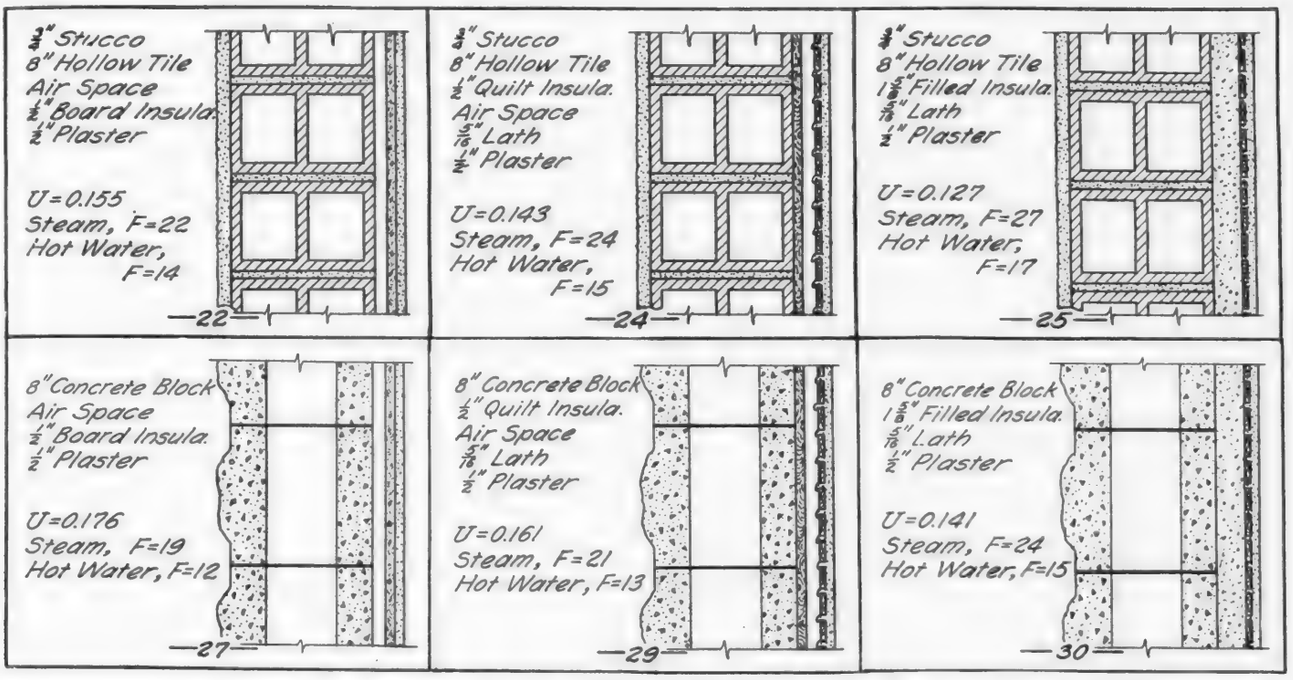
(4) Divide the cubic contents in cubic feet by 190.

(5) The sum of the results obtained by 1, 2, 3 and 4 is the square feet of radiation required.

EXAMPLE NO. 1: To find the square feet of steam radiation required in a



Typical Frame and Brick Structures With Insulation of Various Types



Typical Tile and Concrete Block Construction with Board, Quilt and Filler Insulation

room 20 ft. x 13 ft. with an 8 ft. ceiling, in a bungalow-type house, the room being exposed on two sides and having three windows, each 3 ft. x 5 ft., and one door 3 ft. x 7 ft. The house is of frame construction, the side walls insulated with ½ in. quilt as shown in plate No. 7 "Wall Constructions." (See Page 94) The ceiling is also insulated with ½ in. quilt, as shown in plate No. 3 "Ceiling Constructions." (See Page 97)

Secure the Information Necessary

		SQ. FT.
A.	Exposed wall = (20 x 8) + (13 x 8) = ...	264
	To get the net exposed wall, subtract the area of the three windows and the door, or 3 x (3 x 5) + (3 x 7) = ...	66
	Net exposed wall.....	198
B.	Ceiling Area = 20 x 13 = ...	260
C.	Cubic content of room = 20 x 13 x 8 = ...2,080 cu. ft.	
1.	Net exposed wall 198 ÷ 20 (Factor Steam, F, as shown in No. 7—"Wall Constructions") = ...	9.9
2.	Ceiling 260 ÷ 27 Factor Steam, F, as shown in No. 3—"Ceiling Constructions") = ...	9.6
3.	Glass 66 ÷ 2.8 = ...	23.6
4.	Cubic contents 2,080 ÷ 190 = ...	10.9
5.	Steam radiation required.	54.0

HOT WATER

To calculate the square feet of water radiation required with an indoor temperature of 70° F., and an outdoor temperature of 0° F., with one air change per hour occurring in the room (for other conditions see Notes A, B, and C):

(1) Divide the square feet of net exposed wall by the factor *Hot Water*, F., taken from the table of walls.

(2) Divide the square feet of cold ceilings or floor by the factor *Hot Water*, F., taken from the table of ceilings or floors.

(3) Divide the square feet of single glass by 1.8.

(4) Divide the cubic contents in cubic feet by 120.

(5) The sum of the results obtained by 1, 2, 3 and 4 is the square feet of water radiation required.

EXAMPLE NO. 2: Proceed as in EXAMPLE NO. 1, using HOT WATER, F, instead of STEAM, F.

		SQ. FT.
1.	Net exposed wall 198 ÷ 12 (Hot Water Factor, F, as shown in No. 7—"Wall Constructions") = ...	16.5
2.	Ceiling 260 ÷ 17 (Hot Water Factor, F, as shown in No. 3—"Ceiling Constructions") = ...	15.3
3.	Glass 66 ÷ 1.8 = ...	36.66
4.	Cubic contents 2,080 ÷ 120 = ...	17.33
5.	Water radiation required.	85.79

NOTE A: In case the insulation is placed on the roof rafters instead of in the ceiling, use the Factor F., taken from the table of roofs.

NOTE B: If it is desired to use some number of air changes other than one, then the cubic contents of the room must be multiplied by the number of air changes desired, before making the calculation listed under heading (4). As a guide in estimating the number of air changes to be used, the following table may be of some assistance:

Air Changes

Description	Number of Air Changes Per Hour
Living rooms with windows one side	1
Living rooms with windows two sides	1½
Living rooms with windows three sides	2
Sleeping rooms	1
Entrance halls	2
Public garages, ground floor	2 to 5
Public garages, floors above ground floor	1
Private garages	1 to 2

NOTE C: In order to correct for temperature other than zero outside and 70° F. inside, the radiation should first be calculated as outlined in the preceding sections and then multiplied by a number taken from the table on the following page and corresponding to the actual outside and inside temperatures desired:

For example: If the temperature outside is —20° F. and the temperature inside is 60° F., then the multiplier to be used from the table is 1.07.

DERIVATION OF FACTORS GIVEN IN TABLES

The factor U is the overall coefficient of heat transmission from air on one side of the wall to air on the other side. It is the B.T.U. transmitted per hour per square foot of wall per degree difference in temperature between the air inside and the air outside, and has been calculated from the following commonly accepted formula:

$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{x_1}{c_1} + \frac{x_2}{c_2} + \text{etc.}}$$

CORRECTION FACTORS FOR TEMPERATURE RANGE

Outside Temperature Deg. F.	Inside Temperature Deg. F. 50	55	60	65	70	75	80
30	0.25	0.32	0.40	0.48	0.57	0.67	0.77
20	0.38	0.45	0.54	0.62	0.71	0.81	0.92
10	0.50	0.58	0.67	0.76	0.86	0.96	1.07
Zero	0.63	0.71	0.80	0.90	1.00	1.11	1.23
—10	0.75	0.84	0.94	1.04	1.14	1.26	1.38
—20	0.88	0.97	1.07	1.17	1.29	1.41	1.54
—30	1.01	1.10	1.21	1.31	1.43	1.56	1.69

in which K_1 and K_2 are the surface coefficients or the B.T.U. transmitted per hour per square foot of surface per degree difference in temperature between the surface and the air, c_1, c_2, etc., are the coefficients of conductivity, or the B.T.U. transmitted per hour per square foot per degree difference in temperature between the surfaces for 1 in. of thickness of the material, and x_1, x_2, etc., are the thicknesses of the various materials in inches.

The following values have been used in the calculations:

CONDUCTIVITY PER INCH OF MATERIAL C

Material	C	Authority
Board insulation	0.35	Average used by committee
Quilt insulation	0.30	Average used by committee
Filler insulation	0.40	Average used by committee
Wood	1.00	Willard
Plaster, gypsum	5.00	U. S. Bureau of Standards
Stucco, cement	8.00	Willard
Mortar	8.00	Willard
Brick	5.00	Willard
Concrete block	4.84	A. S. H. V. E. *Guide*
Concrete	8.30	Willard
Cinders	5.00	.....

CONDUCTIVITY FOR THICKNESS OF MATERIAL AS USED, C_u

Material	C_u	Authority
Building paper	4.20	Peebles
Asphalt shingles	6.50	Peebles
8-in. hollow tile	0.43	A. S. H. V. E. *Guide*
4-in. hollow tile	0.65	A. S. H. V. E. *Guide*

HOW THE CONDUCTIVITIES OF VARIOUS TYPES OF INSULATION WERE DETERMINED

The following considerations influenced the choice of the average conductivities used by the committee. For the board insulations, as published in the Bureau of Standards' letter circular No. 227, the spread of the data was from 0.30 to 0.40. A median value of 0.35 half way between these two, therefore, representing the average values very well, and at the same time introduced practically the same percentage deviation for the highest and lowest values. In the same way the spread for the quilts was from 0.25 to 0.35, which gave a value of 0.30 for the median. For the filler insulation, the rock wools with a density of 14 lbs. per cubic foot, cellular gypsum with a density of 12 lbs. per cubic foot, and powdered gypsum with a density of 26 lbs. per cubic foot were considered representative for residence work. The total spread of data for these was from 0.28 to 0.52, giving a median value of 0.40.

In all cases a wind velocity of 15 miles per hour was assumed and the value 4.02 was used for the outside surface coefficient, K_2. An average value of 1.34 was used for all inside and still air surface coefficients, K_1.

The overall heat transmission coefficients apply strictly to the constructions as stated with the corresponding drawings in the tables. Some deviations may be observed between these values and the ones published in the A. S. H. V. E. *Guide* for 1928. Such deviations may be traced to small differences in structural details for the similar walls and to differences in the average conductivities for insulating materials. The deviations are so small, however, that either set of coefficients may be accepted as representative.

If the coefficients, U_1, for walls having additional thicknesses of insulating material over those shown are desired, they may be obtained from the following equation:

$$U_1 = \frac{1}{\frac{1}{U} + \frac{x}{c}}$$

where x is the thickness of the additional insulation, c its conductivity per inch and U the overall coefficient for the same wall without the additional insulation.

Assuming a temperature of 70° F. indoors and 0° F. outdoors, then the square feet of steam radiation required to offset the heat loss from 1 sq. ft. of wall is:

$$\text{Sq. ft. steam radiation} = \frac{70 \times U}{240}$$

From this it follows directly that the number of square feet of wall equivalent to 1 sq. ft. of steam radiation, F, is:

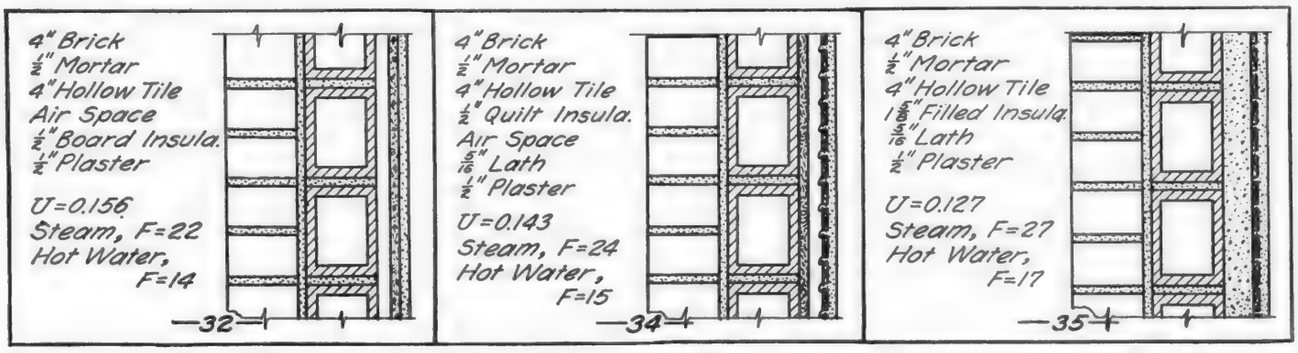
$$F = \frac{240}{70 \times U}$$

Hence, in order to determine the number of square feet of radiation necessary to offset the heat loss from the total number of square feet of net wall surface, it is only necessary to divide the net area of the exposed wall by the factor F. The corresponding factor for water radiation is:

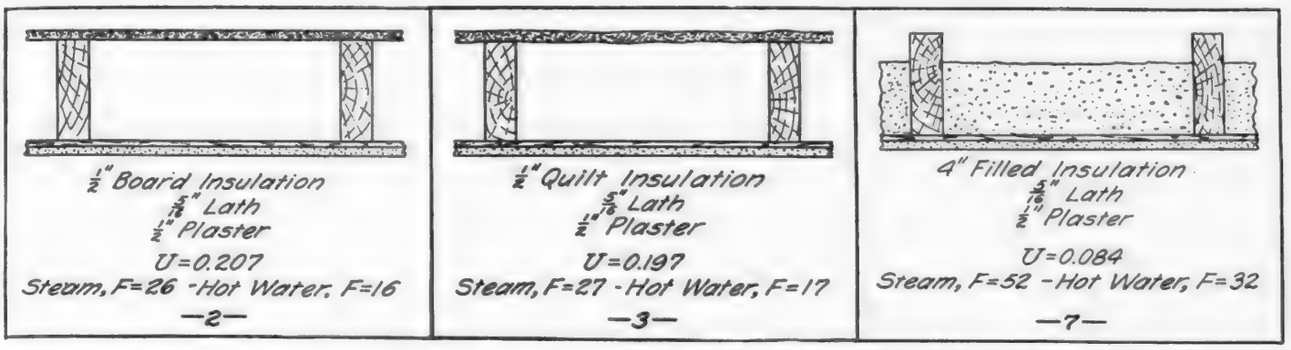
$$F = \frac{150}{70 \times U}$$

These two factors have been designated in the tables as ***Steam, F,*** and ***Hot Water, F.***

The case of ceilings is complicated by the fact that the temperature to be expected in the attic depends on how well insulated the ceiling is. Well insulated ceilings are accompanied by low attic temperatures. The following schedule was used for calculating the factors for ceilings:



Typical Walls of Brick, Hollow Tile and Insulation



Board, Quilt and Filler Insulation for Ceilings

Value of U for Ceiling	Attic Temperature Deg. F.	Temperature Range, R, Room to Attic
0.525	35	35
0.240 to 0.197	25	45
0.170 to 0.131	20	50
0.111 to 0.070	15	55

The factors were then calculated from the equations:

$$\text{Steam, } F = \frac{240}{RU}$$

$$\text{Hot Water, } F = \frac{150}{RU}$$

In order to allow for conditions in which the insulation is placed on the lower side of or between the roof rafters, the combined coefficient U has been calculated from the formula:

$$U = \frac{nU_rU_c}{nU_r + U_c}$$

in which U equals the combined overall heat transmission coefficient in terms of the ***ceiling area,*** U_r equals the overall heat transmission coefficient for the roof construction, U_c equals the overall heat transmission coefficient for the ceiling construction, and n equals the ratio of roof area to ceiling area. A pitch of 1/3 has been selected as being representative for the average roof. The overall temperature range of 70° F. must be used under these conditions, and hence

$$\text{Steam, } F = \frac{240}{70 \times U}$$

$$\text{Hot Water, } F = \frac{150}{70 \times U}$$

COEFFICIENT FOR SINGLE GLASS

The coefficient, U, for single glass may safely be taken as 1.20. The factors for glass then become

$$\text{Steam, } F_g = \frac{240}{70 \times 1.20} = 2.8$$

$$\text{Hot Water, } F_g = \frac{150}{70 \times 1.20} = 1.8$$

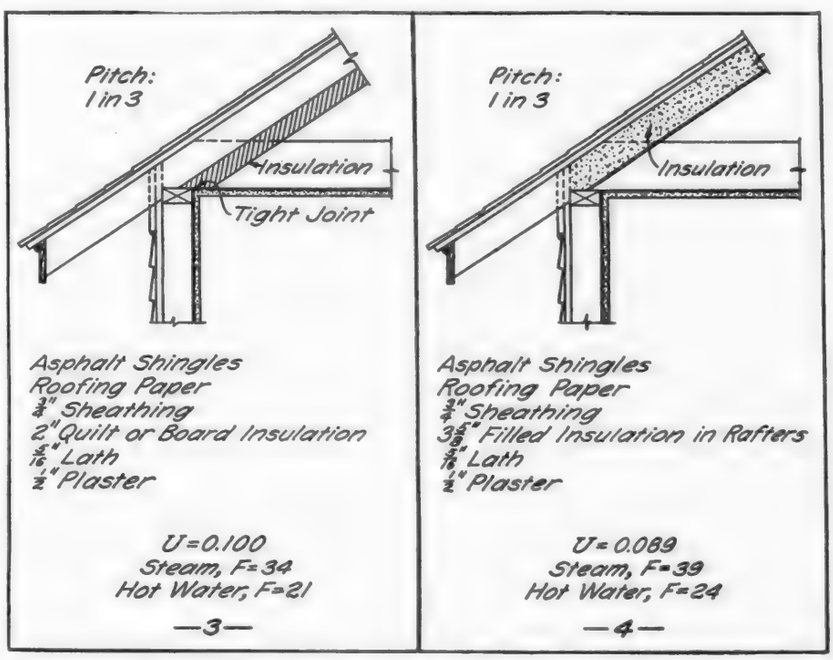
The factors for air change may be calculated in the same way. These factors should be based on the number of air changes in the temperature of air in the room, that is, at 70° F. If one air change per hour is assumed, the factors become

$$\text{Steam, } F_a = \frac{240}{0.24 \times 0.075 \times 70} = 190$$

$$\text{Hot Water, } F_a = \frac{150}{0.24 \times 0.075 \times 70} = 120$$

For floors over an unheated basement, a temperature of 65° F. has been assumed over the floor, and a temperature of 35° F., or the mean between 70° and 0° F., has been assumed under the floor. The steam and hot water factors have been calculated for a temperature difference of 65° — 35° = 30° F.

For concrete floors laid on cinders on the ground, a temperature of 65° F. above the floor, and of 50° F. for the ground has been assumed and the steam and hot water factors calculated for a temperature difference of 65° — 50° = 15° F.



Insulating Roofs With Quilt or Board or Filler Insulation

Cornerstone Laid of New A. G. A. Laboratory

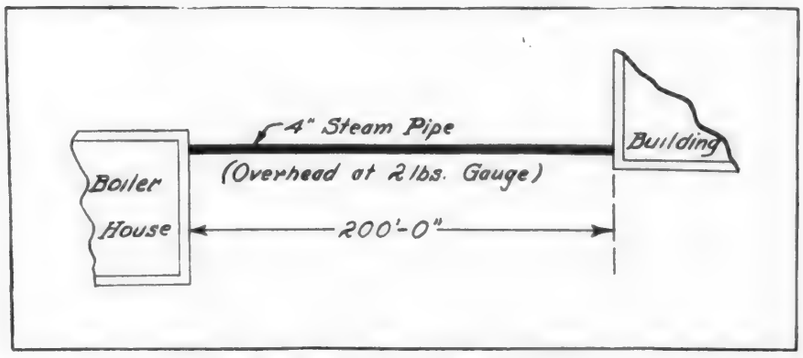
The cornerstone of the new testing laboratory of the American Gas Association, Cleveland, O., was laid March 15. Special ceremonies were witnessed by representatives of a number of gas-appliance manufacturing companies in Cleveland, the laboratory testing and office staffs, officials of the A.G.A., and many others. R. W. Gallagher, chairman of the managing committee of the laboratory, opened the ceremony with a brief talk, paying tribute to the manufacturer company members of the association who have helped to make the laboratory a success. Since the temporary quarters were established in May, 1925, a total of more than 7300 appliances have been tested and approved for public use. The new building will make available about 30,000 sq. ft. of space, as against the previous space of 12,000 sq. ft.

Among the speakers at the laying of the cornerstone and at the luncheon which followed were: Col. Oscar H. Fogg, E. P. Bailey, Jr., R. B. Harper, and W. R. Hopkins, city manager of Cleveland.

How Would You Do It?

Question No. 9

A manufacturing plant has a building 200 ft. away from its boiler plant and intends to run a 4-in. low-pressure overhead steam main, carrying steam at 2 lbs. gauge pressure, from the boiler house to the building. What will be the net saving, if any, per annum, by insulating this main with insulation having 70% efficiency, if the covering, weatherproofing, etc., costs $3 per foot and the boiler plant is using coal at $6 per ton? The coal has 12,000 B.T.U. per pound and the overall boiler efficiency is taken as 72%. Assume this steam line is hot 24 hrs. per day for 365 days in the year, and that 6% interest must be paid on money used. Loss from bare iron pipe can be taken as 3 B.T.U. per square foot, per degree F. of temperature difference.



Problem Presented in Question 9

As the steam main is to be 4-in. pipe and 200 ft. long, the first thing is to compute the surface of the pipe and ascertain the heat loss when the line is uncovered.

Reference to pipe tables shows that a 4-in. line will have an outside surface of 1.178 sq. ft. per linear ft., so the total surface will be

1.178 sq. ft. × 200 ft. = 235.6 sq. ft.

The loss per hour for 1° F. temperature difference then is

236 × 3 B.T.U. = 707 B.T.U.

Steam pressure being assumed as 2 lbs., the temperature of the steam (from steam table) will be 219° F.

The line apparently is used in some industrial process, or for heating water, as steam is on continuously. For the purposes of calculation we must assume an average atmospheric temperature for the year: let this be 60° F.

Then the average temperature difference between steam and atmosphere will be

219° F. — 60° F. = 159° F.

As the loss per hour for 1° F. temperature difference is 707 B.T.U., the average loss per hour will be

707 B.T.U. × 159 = 112,413 B.T.U.

But during the year the number of hours will be

24 hrs. × 365 = 8760 hrs.

so the total heat loss for the year will be

112,413 B.T.U. × 8760 = 984,737,900 B.T.U.

This is the loss if the pipe is left uncovered. With a boiler-plant efficiency of 72% and burning coal containing 12,000 B.T.U. per lb., the net heat delivered to the steam per pound of coal burned will be

12,000 B.T.U. × 0.72 = 8640 B.T.U.

and since there are 2000 pounds of coal to the ton, available heat for every ton of coal burned will be

8640 B.T.U. × 2000 = 17,280,000 B.T.U.

As the annual loss from the bare pipe was 984,737,900 B.T.U. and the heat derived from each ton of coal is 17,280,000 B.T.U., the coal required to supply the heat lost by the bare pipe line is

984,737,900/17,280,000 = 56.99 tons

With coal at $6.00 per ton the heat annually lost from the bare line will cost

56.99 × $6.00 = $341.94

SAVING BY INSULATING

Assume, now, that the line is covered with an insulation of 70% efficiency; that means that 70% of the heat normally radiated from the bare pipe would be saved. Then the saving due to insulation will be

$341.94 × 0.70 = $239.36

As we have assumed the cost of insulation to be $3.00 per foot, the cost of insulating the line will be

$3 × 200 = $600

which, with 6% interest per annum, would mean an annual interest charge of

$600 × 0.06 = $36

If depreciation is figured at 10% this element will be

$600 × 0.10 = $60 per annum.

There is a certain amount of repair and upkeep to be considered, such as painting and patching. Probably 5% would be a fair allowance for this, making the repair charge

$600 × 0.05 = $30 per annum.

Now summing up the items of cost, it will be found that insulating the line will necessitate a fixed annual expense of

Interest @ 6%	$36
Depreciation @ 10%	60
Upkeep @ 5%	30
	$126

As we have found that the saving in fuel resulting from insulating the line is $238.65, the annual balance will be $239.36 — $126.00 = $113.36 net saving, showing that the insulation would be justified.

PROBLEM FOR NEXT MONTH

Question No. 10

A Vento heater is arranged four rows deep, two stacks wide and two stacks high, with return connections on both ends of each stack. The bottom stacks are 60-in. high and the top stacks 50-in. high. The heater handles 100,000 cu. ft. of air per min. The temperature rise of the air through the four rows is as follows:

First Row..... 0° F.—25° F.
Second row .....25° F.—48° F.
Third row .....48° F.—68° F.
Fourth row .....68° F.—86° F.

What will be the equivalent direct radiation load represented by the condensate coming from each return connection?

National Fire Protection Association Publishes Report of the Committee on Garages

Pre-convention publication of proposed regulations for bus garages has been prepared by the National Fire Protection Association, in advance of the annual meeting in Atlantic City, May 7-10. This report includes modifications of the recommendations made by the special committee on garage ventilation, on which the A.S.H. & V.E. was represented, and that was reported at the White Sulphur Springs meeting last summer, arousing considerable adverse comment. A copy of this advance report is available from the National Fire Protection Association, 40 Central St., Boston, Mass.

How to Use the Chicago Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right- or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Chicago, Ill.: 70 sq. ft. of 12-in. brick wall. Read down the column headed "Plain Brick 12-in."; the corresponding figure in the table is 70.2. Following horizontally to extreme left or right shows 6 sq. ft. of 38-in. 3-col. radiation. If wall faces north, multiply by 1.25, making 7.5 sq. ft. actually required.

If the same wall has 30 sq. ft. of glass or door, the corresponding figure in the table under "Glass" is 30.7, or the equivalent of 9 sq. ft. This figure, multiplied by the exposure factor 1.25, equals 11.25 sq. ft. If window has 39 lin. ft. of crack and is double-hung wood sash, without weatherstrips, the corresponding figure in the table (using the column headed "50" under "Infiltration") falls between 37.6 and 41.2, or the equivalent of 9.5 sq. ft. of radiation. Multiplying by 1.25 for exposure equals 11.87 sq. ft. of radiation.

The three quantities—7.5, 11.25 and 11.87—equal 30.62, or, for simplicity, 31 sq. ft. as the total radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights unless skylights are vertical or practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

How to Use the Norfolk Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right- or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Norfolk, Va.: 70 sq. ft. of 12-in. brick wall. Read down the column headed "Plain Brick 12-in."; the nearest corresponding figure in the table is 70.4. Following horizontally to extreme left or right shows 4 sq. ft. of 38-in. 3-col. radiation. If the wall faces north, multiply by 1.5, making 6 sq. ft. actually required.

If the same wall has 30 sq. ft. of glass or door, the corresponding figure in the table under "Glass" is 30.7, or the equivalent of 6 sq. ft. This figure, multiplied by exposure factor 1.5, equals 9 sq. ft. If the window has 39 lin. ft. of crack and is double-hung wood sash, without weatherstrips, the corresponding figure in the table (using the column headed "50" under "Infiltration") falls between 37.5 and 43.8, or the equivalent of 6.5 sq. ft. of radiation. Multiplying by 1.5 for exposure equals 9.75 sq. ft. of radiation.

The three quantities—6, 9 and 9.75—equal 24.75, or, for simplicity, 25 sq. ft. as the total radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights unless skylights are vertical or practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS

STANDARD RADIATION ESTIMA

SHOWING RADIATION REQUIRED FOR QUA

Copyright 1927. by Heating and Piping Contractors National Association. For Other Construction than that Sh

3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																	
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L.	
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	.60	.48	.41	.50	.40	
225	66.0	78.0	27.0	54.0	108	216	25.2	19.2	15.6	22.8	17.4	15.0	16.2	13.8	12.6	18.0	15.6	13.2	36.0	28.8	24.6	30.0	24.0	
1	3.41	2.89	8.34	4.17	2.08	1.04	8.93	11.7	14.4	9.9	12.9	15.0	13.9	16.2	17.9	12.5	14.4	17.0	6.25	7.82	9.15	7.5	9.38	
2	6.82	5.78	16.7	8.34	4.16	2.08	17.9	23.4	28.8	19.8	25.8	30.0	27.8	32.4	35.8	25.0	28.8	34.0	12.5	15.6	18.3	15.0	18.8	
3	10.2	8.67	25.0	12.5	6.24	3.12	26.8	35.1	43.2	29.7	38.7	45.0	41.7	48.6	53.7	37.5	43.2	51.0	18.8	23.5	27.5	22.5	28.1	
4	13.6	11.6	33.4	16.7	8.32	4.16	35.7	46.8	58.6	39.6	51.6	60.0	55.6	64.8	71.6	50.0	57.6	68.0	25.0	31.3	36.6	30.0	37.5	
5	17.1	14.5	41.7	20.8	10.4	5.20	44.7	58.5	72.0	49.5	64.5	75.0	69.5	81.0	89.5	62.5	72.0	85.0	31.3	39.1	45.8	37.5	46.9	
6	20.5	17.3	50.0	25.0	12.5	6.24	53.6	70.2	86.4	59.4	77.4	90.0	83.4	97.2	107	75.0	86.4	102	37.5	47.0	54.9	45.0	56.3	
7	23.9	20.2	58.4	29.2	14.6	7.28	62.5	81.9	101	69.3	90.3	105	97.3	113	125	87.5	101	119	43.8	54.7	64.1	52.5	65.7	
8	27.3	23.1	66.7	33.4	16.6	8.32	71.4	93.6	115	79.2	103	120	111	130	143	100	115	136	50.0	62.6	73.2	60.0	75.0	
9	30.7	26.0	75.1	37.6	18.7	9.36	80.4	105	130	89.1	116	135	125	146	161	113	130	153	56.3	70.4	82.4	67.5	84.4	
10	34.1	29.0	83.4	41.7	20.8	10.4	89.3	117	144	99.0	129	150	139	162	179	125	144	170	62.6	78.2	91.5	75.0	93.8	
11	37.6	31.8	91.8	45.9	22.9	11.4	98.2	129	158	109	142	165	153	178	197	138	158	187	68.8	86.0	101	82.5	103	
12	40.9	34.7	100	50.0	25.0	12.5	107	140	173	119	155	180	167	194	215	150	173	204	75.0	93.8	110	90.0	113	
13	44.3	37.6	108	54.2	27.0	13.5	116	152	187	129	168	195	181	211	233	163	187	221	81.3	102	119	97.5	122	
14	47.7	40.5	117	58.4	29.1	14.6	125	164	202	139	181	210	195	227	251	175	202	238	87.5	109	128	105	131	
15	51.2	43.4	125	62.6	31.2	15.6	134	176	216	149	194	225	209	243	269	188	216	255	93.8	117	137	113	141	
16	54.6	46.2	133	66.7	33.3	16.6	143	187	230	158	206	240	222	259	286	200	230	272	100	125	146	120	150	
17	58.0	49.1	142	70.9	35.4	17.7	152	199	245	168	219	255	236	275	304	213	245	289	106	133	156	128	159	
18	61.4	52.0	150	75.1	37.4	18.7	161	211	259	178	232	270	250	292	322	225	259	306	113	141	165	135	169	
19	64.8	54.9	158	79.2	39.5	19.7	170	222	274	188	245	285	264	308	340	238	274	323	119	149	174	143	178	
20	68.2	57.8	167	83.4	41.6	20.8	179	234	288	198	258	300	278	324	358	250	288	340	125	156	183	150	188	
21	71.6	60.7	175	87.6	43.7	21.8	187	246	302	208	271	315	292	340	376	263	302	357	131	164	192	158	197	
22	75.0	63.6	183	91.7	45.8	22.9	196	257	317	218	284	330	306	356	394	275	317	374	138	172	201	165	206	
23	78.4	66.5	192	96.0	47.8	23.9	205	269	331	228	297	345	320	373	412	288	331	391	144	180	210	173	216	
24	81.8	69.4	200	100	49.9	25.0	214	281	346	238	310	360	334	389	430	300	346	408	150	188	220	180	225	
25	85.3	72.3	209	104	52.0	26.0	223	293	360	248	323	375	348	405	448	313	360	425	156	196	229	188	235	

Revision of Data Sheet No. 13 G 2

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS

STANDARD RADIATION ESTIMA

SHOWING RADIATION REQUIRED FOR QUA

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																	
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L.	
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	.60	.48	.41	.50	.40	
225	44.0	52.0	18.0	36.0	72.0	144	16.8	12.8	10.4	15.2	11.6	10.0	10.8	9.20	8.40	12.0	10.4	8.80	24.0	19.2	16.4	20.0	16.0	
1	5.11	4.33	12.5	6.25	3.13	1.56	13.4	17.6	21.6	14.8	19.4	22.5	20.9	24.5	26.8	18.8	21.6	25.6	9.38	11.7	13.7	11.3	14.1	
2	10.2	8.66	25.0	12.5	6.26	3.12	26.8	35.2	43.2	29.6	38.8	45.0	41.8	49.0	53.6	37.6	43.2	51.2	18.8	23.4	27.4	22.6	28.2	
3	15.3	13.0	37.5	18.8	9.39	4.68	40.2	52.8	64.8	44.4	58.2	67.5	62.7	73.5	80.4	56.4	64.8	76.8	28.1	35.1	41.1	33.9	42.3	
4	20.4	17.3	50.0	25.0	12.5	6.24	53.6	70.4	86.4	59.2	77.6	90.0	83.6	98.0	107	75.2	86.4	102	37.5	46.8	54.8	45.2	56.4	
5	25.6	21.7	62.5	31.3	15.7	7.80	67.0	88.0	108	74.0	97.0	113	105	123	134	94.0	108	128	46.9	58.5	68.5	56.5	70.5	
6	30.7	26.0	75.0	37.5	18.8	9.36	80.4	106	130	88.8	116	135	125	147	161	113	130	154	56.3	70.2	82.2	67.8	84.6	
7	35.8	30.3	87.5	43.8	21.9	10.9	93.8	123	151	104	136	158	146	172	188	132	151	179	65.7	81.9	95.9	79.1	98.7	
8	40.9	34.6	100	50.0	25.0	12.5	107	141	173	118	155	180	167	196	214	150	173	205	75.0	93.6	110	90.4	113	
9	46.0	39.0	113	56.3	28.2	14.0	121	158	194	133	175	203	188	221	241	169	194	230	84.4	105	123	102	127	
10	51.1	43.3	125	62.5	31.3	15.6	134	176	216	148	194	225	209	245	268	188	216	256	93.8	117	137	113	141	
11	56.2	47.6	138	68.8	34.4	17.2	147	194	238	163	213	248	230	270	295	207	238	282	103	129	151	124	155	
12	61.3	52.0	150	75.0	37.6	18.7	161	211	259	178	233	270	251	294	322	226	259	307	113	140	164	136	169	
13	66.4	56.3	163	81.3	40.7	20.3	174	229	281	192	252	293	272	319	348	244	281	333	122	152	178	147	183	
14	71.5	60.6	175	87.5	43.8	21.8	188	246	302	207	271	315	293	343	375	263	302	358	131	164	192	158	197	
15	76.7	65.0	188	93.8	47.0	23.4	201	264	324	222	291	338	314	368	402	282	324	384	141	176	206	170	212	
16	81.8	69.3	200	100	50.0	25.0	214	282	346	237	310	360	334	392	429	301	346	410	150	187	219	181	226	
17	86.9	73.6	213	106	53.2	26.5	228	299	367	252	330	383	355	417	456	320	367	435	159	199	233	192	240	
18	92.0	77.9	225	113	56.3	28.1	241	317	389	266	349	405	376	441	482	338	389	461	169	211	247	203	254	
19	97.1	82.3	238	119	59.5	29.6	255	334	410	281	369	428	397	466	509	357	410	486	178	222	260	215	268	
20	102	86.6	250	125	62.6	31.2	268	352	432	296	388	450	418	490	536	376	432	512	188	234	274	226	282	
21	107	90.9	263	131	65.7	32.8	281	370	454	311	407	473	439	515	563	395	454	538	197	246	288	237	296	
22	112	95.3	275	138	68.9	34.0	295	387	475	326	427	495	460	539	590	414	475	563	206	257	301	249	310	
23	118	99.6	288	144	72.0	35.9	308	405	497	340	446	518	481	564	616	432	497	589	216	269	315	260	324	
24	123	104	300	150	75.0	37.4	322	422	518	355	466	540	502	588	643	451	518	614	225	281	329	271	338	
25	128	108	313	156	78.3	39.0	335	440	540	370	485	563	523	613	670	470	540	640	235	293	343	283	353	

TORS NATIONAL ASSOCIATION

ESTIMATING TABLE

FOR QUANTITIES INDICATED

ction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

CHICAGO
(Also MILWAUKEE, WIS.)

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	$70°=T_1$	N	1.25	S	1.15
Base Temperature	$+10°=T_0$	NE	1.00	SW	1.35
Base Temp. +10°	Equivalent to	E	1.00	W	1.35
Guarantee Temp. of	—5° Outside	SE	1.00	NW	1.35

Conc. Fur L. P. 8"	12"	16"	Frame Std.	Frame No Sh'g	Frame No L. P.	ROOF T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Base Floor Conc. on Earth	Wood on Sleep.	Interm'e Floor 4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Ceiling Lath and Plas.	L & P Wo. Fl. Over	Partition Stud L & P 1 Side	Stud L & P 2 Side	Type Kind Thick.
.50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33	K
30.0	24.0	20.4	14.4	18.6	21.0	18.0	36.0	24.0	18.0	9.3	3.9	6.0	4.5	6.0	14.7	8.4	18.0	9.9	K(T1-T0)
7.5	9.38	11.0	15.6	12.1	10.7	12.5	6.25	9.38	12.5	24.2	57.7	37.5	50.0	37.5	15.3	26.8	12.5	22.7	1
15.0	18.8	22.0	31.2	24.2	21.4	25.0	12.5	18.8	25.0	48.4	115	75.0	100	75.0	30.6	53.6	25.0	45.4	2
22.5	28.1	33.0	46.8	36.3	32.1	37.5	18.8	28.1	37.5	72.6	173	113	150	113	45.9	80.4	37.5	68.1	3
30.0	37.5	44.0	62.4	48.4	42.8	50.0	25.0	37.5	50.0	96.8	231	150	200	150	61.2	107	50.0	90.8	4
37.5	46.9	55.0	78.0	60.5	53.5	62.5	31.3	46.9	62.5	121	289	188	250	188	76.5	134	62.5	114	5
45.0	56.3	66.0	93.6	72.6	64.2	75.0	37.5	56.3	75.0	145	346	225	300	225	91.8	161	75.0	136	6
52.5	65.7	77.0	109	84.7	74.9	87.5	43.8	65.7	87.5	169	404	263	350	263	107	188	87.5	159	7
60.0	75.0	88.0	125	96.8	85.6	100	50.0	75.0	100	194	462	300	400	300	122	214	100	182	8
67.5	84.4	99.0	140	109	96.3	113	56.3	84.4	113	218	519	338	450	338	138	241	113	204	9
75.0	93.8	110	156	121	107	125	62.6	93.8	125	242	577	375	500	375	153	268	125	227	10
82.5	103	121	172	133	118	138	68.8	103	138	266	635	413	550	413	168	295	138	250	11
90.0	113	132	187	145	128	150	75.0	113	150	290	692	450	600	450	184	322	150	272	12
97.5	122	143	203	157	139	163	81.3	122	163	315	750	488	650	488	199	348	163	295	13
105	131	154	218	169	150	175	87.5	131	175	339	808	525	700	525	214	375	175	318	14
113	141	165	234	182	161	188	93.8	141	188	363	866	563	750	563	230	402	188	341	15
120	150	176	250	194	171	200	100	150	200	387	923	600	800	600	245	429	200	363	16
128	159	187	265	206	182	213	106	159	213	411	981	638	850	638	260	456	213	386	17
135	169	198	281	218	193	225	113	169	225	436	1039	675	900	675	275	482	225	409	18
143	178	209	296	230	203	238	119	178	238	460	1096	713	950	713	291	509	238	431	19
150	188	220	312	242	214	250	125	188	250	484	1154	750	1000	750	306	536	250	454	20
158	197	231	328	254	225	263	131	197	263	508	1212	788	1050	788	321	563	263	477	21
165	206	242	343	266	235	275	138	206	275	532	1269	825	1100	825	337	590	275	499	22
173	216	253	359	278	246	288	144	216	288	557	1327	863	1150	863	352	616	288	522	23
180	225	264	374	290	257	300	150	225	300	581	1385	900	1200	900	367	643	300	545	24
188	235	275	390	303	268	313	156	235	313	605	1443	938	1250	938	383	670	313	568	25

←——These Items Figured on Basis of K $\left(\frac{T_1-T_0}{2}\right)$ ——→

TORS NATIONAL ASSOCIATION

ESTIMATING TABLE

FOR QUANTITIES INDICATED

ction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

NORFOLK, VIRGINIA

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	$70°=T_1$	N	1.50	S	1.00
Base Temperature	$+30°=T_0$	NE	1.30	SW	1.20
Base Temp. +30°	Equivalent to	E	1.20	W	1.50
Guarantee Temp. of	+15° Outside	SE	1.00	NW	1.50

Conc. Fur L. P. 8"	12"	16"	Frame Std.	Frame No Sh'g	Frame No L. P.	ROOF T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Base Floor Conc. on Earth	Wood on Sleep.	Interm'e Floor 4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Ceiling Lath and Plas.	L & P Wo. Fl. Over	Partition Stud L & P 1 Side	Stud L & P 2 Side	Type Kind Thick.
.50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33	K
20.0	16.0	13.6	9.60	12.4	14.0	12.0	24.0	16.0	12.0	6.20	2.60	4.00	3.00	4.00	9.80	5.60	12.0	6.60	K(T1-T0)
11.3	14.1	16.6	23.4	18.2	16.1	18.8	9.38	14.1	18.8	36.3	86.5	56.3	75.0	56.3	23.0	40.2	18.8	34.1	1
22.6	28.2	33.2	46.8	36.4	32.2	37.6	18.8	28.2	37.6	72.6	173	113	150	113	46.0	80.4	37.6	68.2	2
33.9	42.3	49.8	70.2	54.6	48.3	56.4	28.1	42.3	56.4	109	260	169	225	169	69.0	121	56.4	102	3
45.2	56.4	66.4	93.6	72.8	64.4	75.2	37.5	56.4	75.2	145	346	225	300	225	92.0	161	75.2	136	4
56.5	70.5	83.0	117	91.0	80.5	94.0	46.9	70.5	94.0	182	433	282	375	282	115	201	94.0	171	5
67.8	84.6	99.6	140	109	96.6	113	56.3	84.6	113	218	519	338	450	338	138	241	113	205	6
79.1	98.7	116	164	127	113	132	65.7	98.7	132	254	606	394	525	394	161	281	132	239	7
90.4	113	133	187	146	129	150	75.0	113	150	290	692	450	600	450	184	322	150	273	8
102	127	149	211	164	145	169	84.4	127	169	327	779	507	675	507	207	362	169	307	9
113	141	166	234	182	161	188	93.8	141	188	363	865	563	750	563	230	402	188	341	10
124	155	183	257	200	177	207	103	155	207	399	952	619	825	619	253	442	207	375	11
136	169	199	281	218	193	226	113	169	226	436	1038	676	900	676	276	482	226	409	12
147	183	216	304	237	209	244	122	183	244	472	1125	732	975	732	299	523	244	443	13
158	197	232	328	255	225	263	131	197	263	508	1211	788	1050	788	322	563	263	477	14
170	212	249	351	273	242	282	141	212	282	545	1298	845	1125	845	345	603	282	512	15
181	226	266	374	291	258	301	150	226	301	581	1384	901	1200	901	368	643	301	546	16
192	240	282	398	309	274	320	159	240	320	617	1471	957	1275	957	391	683	320	580	17
203	254	299	421	328	290	338	169	254	338	653	1557	1013	1350	1013	414	724	338	614	18
215	268	315	445	346	306	357	178	268	357	690	1644	1070	1425	1070	437	764	357	648	19
226	282	332	468	364	322	376	188	282	376	726	1730	1126	1500	1126	460	804	376	682	20
237	296	349	491	382	338	395	197	296	395	762	1817	1182	1575	1182	483	844	395	716	21
249	310	365	515	400	354	414	206	310	414	799	1903	1239	1650	1239	506	884	414	750	22
260	324	382	538	419	370	432	216	324	432	835	1990	1295	1725	1295	529	925	433	784	23
271	338	398	562	437	386	451	225	338	451	871	2076	1351	1800	1351	552	965	451	818	24
283	353	415	585	455	403	470	235	353	470	908	2163	1408	1875	1408	575	1005	470	853	25

Data Sheets Nos. 13 K 3 and 13 L 3

←——These Items Figured on Basis of K $\left(\frac{T_1-T_0}{2}\right)$ ——→

The Heating and Ventilating Magazine's B.T.U. Club

EVERY reader of THE HEATING AND VENTILATING MAGAZINE, *whether a subscriber or not, is a member of this club. There are no initiation fees or dues. There is not even a constitution. The club will function as a forum or round table for the informal discussion by our readers, particularly the younger men in the industry, of topics in which they are interested, provided only that such topics pertain directly or indirectly to heating and ventilation.*

Automobile Parking Scheme That Simplifies Ventilation Problem

MR. CHAIRMAN:

As you know, Chicago has taken radical action in dealing with its street congestion problem. The city has now banned all motor cars from the curbs within the Loop district.

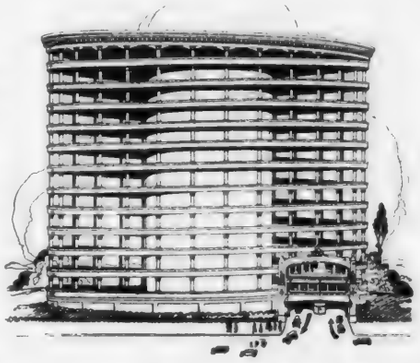
In this connection I would like to know if the scheme shown in the accompanying sketches is not perfectly feasible and is not a good way of handling automobile storage in our large cities, with its attendant ventilation problems.

The scheme was first proposed, I believe, by R. R. Reed, writing in the *Architect and Engineer* for March. Mr. Reed calls it a spiral parkway. In effect, it is a viaduct in the form of an ascending spiral about a glass-enclosed core or cylinder 12 stories or more in height. It may also extend from three to six stories beneath the street level. The glass core or cylinder referred to is 85 ft. in diameter.

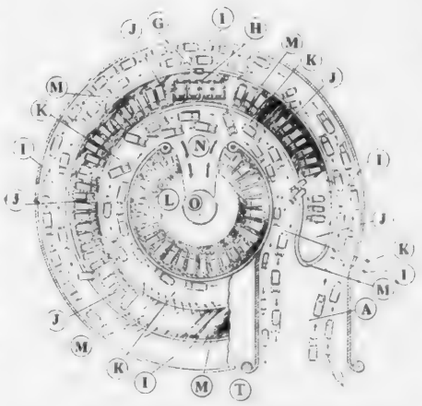
An auto driver, desiring to park, turns into the main entrance A. He proceeds along the outer duct I, until he arrives opposite a vacant stall in the central parking strip J. Here he makes a left quarter-turn, parks his machine transversely to the line of travel, and follows the walk-way M to the elevators H. When ready to remove the car, he simply makes another left quarter-turn, and joins the stream of outgoing traffic at K. (Note that travel is all one-way and that backing and cross-cutting are eliminated.)

Where it is desired to park within the glass-lined enclosure L, the heavy arrows in the upper left quadrant indicate the path taken in order to reach the centrally located turn-table O. It will be seen that in this case, the machines pass through the central parking zone or strip J, and join the out-going traffic K, in the same manner as if it were intended to leave the building. When the point opposite the entrance-way N is reached, they turn in and make use of the turntable O to park.

The space L, if glass-enclosed, would need to be ventilated, and that could be accomplished through exhaust fans located in the roof. It is not absolutely necessary that the space L be insulated by glass, or otherwise, as a curbing of concrete would serve the purpose. (This curbing would not need to be more than 30 in. in height).



Elevation of Parking Spiral for Chicago Loop Section



Plan of Spiral Having Parking Capacity Equivalent to 20 Miles of Street Curb

Allowing one basement and one sub-basement in addition to the structure shown, the capacity of the building would be slightly in excess of 1260 cars at one time. (90 cars per floor or turn of spiral).

Again, allowing eight turnovers per day of the parking space gives 10,080 cars as the daily capacity of the building. At twenty cents each, this amounts to slightly more than $2000 per day gross earning capacity; or at ten cents each, $1000 per day gross earning capacity.

A day's operation such as described would clear approximately 20 miles of curbs of parked machines.

Why 240?

MR. CHAIRMAN:

A boiler salesman entered an office the other day with the idea of interesting some one in his boilers. He appeared to be a pretty intelligent chap with a good grasp of his subject and so was able to get by the outer barricade and had an opportunity to tell all about the good points of his product. After getting most of his story across, the conversation gradually drifted around to boiler ratings.

The salesman commented on the conservatism with which his company rated its boilers, which resulted in his listener inquiring, "Just what basis does your company use in determining the rating of your boilers?"

"Why, the number of square feet of radiation that the boiler will carry," replied the salesman.

"But what is a square foot of radiation?" was the next inquiry.

"Why, 240 B.T.U. is considered as the equivalent of 1 sq. ft. of steam radiation," answered the salesman.

"But. is it?" asked his listener.

"Well," said the salesman, "that is what is generally accepted by boiler manufacturers as the equivalent of the heat emission of 1 sq. ft. of ordinary cast-iron column radiation. We use it, our competitors use it, even some of the steel boiler people use it."

"But what kind of radiation is it supposed to represent and how was the figure determined?" went on his questioner.

The salesman hesitated an instant. Then he said, "To tell you the truth, the figure of 240 B.T.U. as an equivalent for a square foot of steam radiation is a sort of hand-me-down from the old days of column radiation. Originally, many engineers used the figure of 250 B.T.U. to represent the average heat emission of a radiator operating under normal conditions. Later, when more accurate tests were developed, the fact was shown that the old column radiator heat emission varied all the way from over 270 B.T.U. per square foot, down to less than 220 B.T.U. per square foot, and from this it gradually became the practice to allow 240 B.T.U. per square foot to represent the mean between the highest and the lowest extremes, with the idea that this would about cover the average conditions where radiators of all heights, widths and sizes were used."

"But column radiation is now practically a thing of the past," objected his listener.

WHAT PUBLISHED RADIATOR RATINGS MEAN

"True," assented the salesman, "but the new tubular radiation is being rated along similar lines. That is to say, most manufacturers of these radiators are not giving *actual surface areas* in their catalogs on radiators but, instead, are giving *equivalent or nominal surface ratings* based on 240 B.T.U. per *nominal square foot of rating*. Consequently, if the boiler manufacturers rate their boilers on a similar nominal square footage, also based on 240 B.T.U. emission per square foot, from the radiator, then you can see how well the boiler ratings and the radiator ratings coordinate."

But his questioner had by no means finished and continued the discussion by asking, "Then, if I understand you rightly, the 240 B.T.U., when applied to tubular radiation, has little, if anything, to do with the real efficiency of this style of radiation or to its actual heating surface. Is that right?"

"Right!" answered the salesman.

"And, as a matter of fact, we are now trying to rate tubular radiation on a fictitious heat emission of 240 B.T.U. per square foot, which used to be the mean between the highest and lowest efficiencies formerly obtained on a now obsolete type of surface?"

"Right!" again answered the salesman.

"Actually, the 240 B.T.U. rate has not the slightest thing to do with the real heat emission of tubular radiation per square foot?"

"Right!" answered the salesman, for the third time.

"Which leaves the matter that the boiler manufacturers are also rating their boilers on an equally fictitious heat emission of 240 B.T.U. per square foot, which does not apply to tubular radiation?"

"Well," said the salesman, "I suppose you might properly say as much except that when the actual tubular radiator transmission for the whole radiator is divided by 240, the equivalent direct radiation obtained will check with the equivalent direct radiation which we get by dividing our boiler delivery in B.T.U. per hour by 240 and these results are comparable because both are based on an assumed 240 B.T.U. transmission per square foot of radiator."

"But what size of tubular radiator and how many sections in the radiator will give a transmission equal to the nominal radiator surface, as shown in the catalog, times 240?" propounded the questioner.

"Why," the salesman hesitated, "I suppose any tubular radiator of any number of sections will give the real heat transmission in B.T.U. per hour if the nominal surface in the catalog is multiplied by 240."

"Still, you know that the end sections of a radiator are more efficient than the middle sections of the same radiator," stated his questioner.

"Oh, sure," said the salesman, "the heat is 'radiated' from the end sections with less interference than from the middle sections and, consequently, the end sections show a higher emission than the inner sections in comparison to the actual square foot of radiating surface."

"Then, taken as a whole, a radiator of twelve sections would have a lower average heat emission per square foot of actual surface (owing to a larger proportion of middle sections) than a similar radiator of, say, five sections."

"Oh, yes," assented the salesman, "the relative output of the two radiators could not be the same!"

"But," went on his questioner, "you see, do you not, that no radiator with an emission divided by 240 could have the same rating *per section* for a five-section grouping as it would for a six section, or any other number of sections except the exact number used in determining the heat emission. You understand that while it would be possible to compensate for differences in efficiencies for each separate height of radiator and each separate number of tubes in which the radiators are made, it is just as necessary to have an individual number of ratings for each possible number of sections which could be incorporated into a single radiator?"

The salesman admitted that this seemed to be an argument that was unanswerable.

ARE TUBULAR RADIATORS CORRECTLY RATED?

But his interrogator was not yet finished. He continued, "Let us follow this line of thought to its logical conclusion. In the first place, tubular radiation is being rated on an arbitrary assumed emission of 240 B.T.U. per square foot. But the 240 B.T.U. is not correct for the heating surface of a tubular radiator. Therefore, the tubular radiators have had developed a so-called *nominal* rating which is supposed to be the actual radiator transmission in B.T.U. divided by 240.

"As a matter of fact, even this nominal rating cannot be correct except for one certain number of sections in the radiator. An increase in the number of sections reduces the overall efficiency and should reduce the nominal rating, but really no such reduction has been made; similarly, a decrease in the number of sections will increase the overall efficiency of the radiator and should correspondingly increase the nominal rating—but it does not, at least in the catalog."

"To go to the end of the road," continued his questioner, "the boiler ratings must be just as far off as the radiator nominal ratings because they are based on the assumption that every *nominal* square foot of tubular radiation emits 240 B.T.U.—which we have just shown to be impossible except in one single instance — and, therefore, there is practically no relation between the 240 B.T.U. used for the boiler rating and the 240 used for the radiator rating since the 240 is not correct in about nineteen cases out of twenty."

The salesman nodded his head.

"Admitting the truth of these statements," continued his questioner, "is not the only practical way to rate boilers and radiators either on a B.T.U. basis alone or arbitrarily to assume a B.T.U. emission for a square foot of radiation and rate every radiator of each number of sections, as well as the boilers, on this arbitrary standard? Suppose we took 1,000 B.T.U. as a standard for one equivalent square foot of radiation. Then, with a known heat emission from any radiator, the square feet of nominal rating would be

$$\frac{\text{Emission in B.T.U.}}{1000}$$

or simply point off three places. Similarly on boilers, the rating would be the

$$\frac{\text{B.T.U. Delivered in Steam}}{1000}$$

or again point off three places. The condensation would EQUAL the equivalent direct radiation since 1 lb. of steam in condensing gives out about 1000 B.T.U. Every pound of coal would be equal to 8 sq. ft. of nominal radiation since about 8000 B.T.U. are transmitted from each pound of coal burned in an average boiler of fair efficiency. A horsepower would be 33 sq. ft. of nominal radiation since 33,000 B.T.U. make a horse-power. We could call this unit—if you wish—a kilotherm or a M.H.U., meaning in both cases a thousand heat units.

"Think of the advantages in making heat calculations! Point off three decimal places on the B.T.U. and get E.D.R.; add three decimal places to E.D.R. and get B.T.U.; E.D.R. also equals pounds of water per hour; heat loss from your room gives nominal radiator surface by cutting off the last three places."

And that broke up the discussion.

New York Apartment Operates All Utilities with Gas

A 12-FAMILY apartment was erected in Bayside, a Long Island suburb of New York, in which all of the utilities are operated by gas and all such service items are included in the rental charge. The building is heated by a vapor system, heat being supplied by a gas-fired boiler. The domestic water supply is provided by an indirect system installed in this boiler, the thermostatic control maintaining the water at 140° F. Each kitchen is equipped with a combined gas range and gas refrigerator. The building was completed in midwinter and all of the apartments were immediately rented, largely because of the complete and unified utilities arrangements.

It is stated that the meter sales per year will be 200,000 cu. ft. of gas per family, as compared with 40,000 cu. ft., the average meter sale per family in the neighborhood. From this it would seem that the fostering of such equipment would result in a material expansion for the gas company.

Computations to determine radiation for this apartment house are as follows, and are based on the maintenance of a uniform temperature of 70° F. with 0° F. outside.

Radiation at 50° F.—Halls

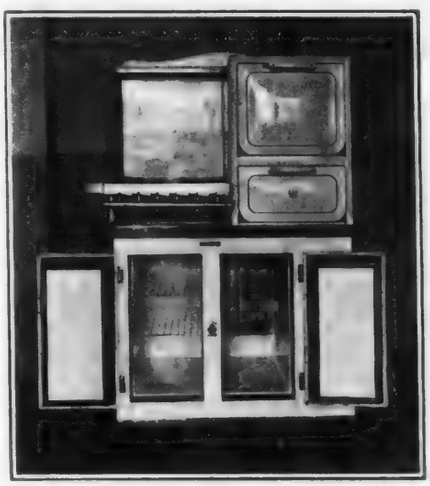
End Houses — C.I.R. boiler tax
17 sq. ft. C.I.R. × 2 × 1.16 = 40 sq. ft.
Center Houses
10 sq. ft. C.I.R. × 4 × 1.16 = 47 sq. ft.

87 sq. ft. radiation at 50° F.

Radiation at 70° F.

End Houses
236 sq. ft. C.I.R. × 2 = 472 sq. ft.
Center Houses
182.7 sq. ft. C.I.R. × 4 = 731 sq. ft.

1290 sq. ft. for 6 houses.



Gas Combination Refrigerator and Range

1290 sq. ft. C.I.R.
323 + 25% for risers and returns cov.

1613
403 + 25% for quick heating

2016 sq. ft. Boiler size on 210 B.T.U. basis
or $2016 \times \frac{210}{240} = 1780$ sq. ft. on 240 B.T.U. basis.

In planning the hot water supply, the following method was used to determine the maximum daily demand:

12 apartments—4 rooms and bath.
90 gals. per apartment per 24 hrs.

Maximum 24-hr. load: $90 \times 12 = 1080$ gal.
Boiler size is $\frac{1080}{10} = 108$ gal. hourly.
Maximum hour is $\frac{1080}{20} = 54$ gal.
Tank size is $4\ (108 - 54) = 216$ gal.

Summary of Radiation Required

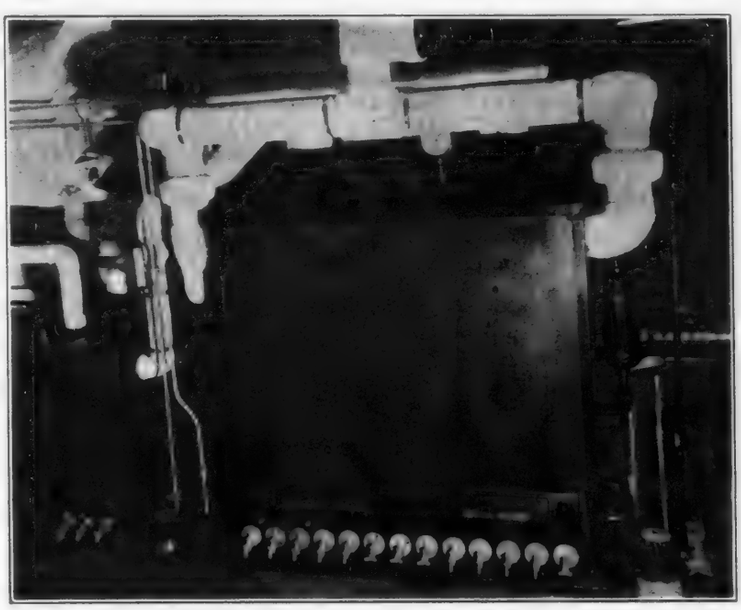
End House*

	Radiation in Sq. Ft. 1st Floor	2nd Floor
Living Room	40.0	41.0
Dining Room	13.0	13.5
Bed Room	27.0	27.0
Kitchen	30.0	32.0
Bath	6.0	6.5
Hall	6.0	11.0
	122.0	131.0

Center House

	1st Floor	2nd Floor
Living Room	37.0	32.0
Dining Room	13.0	13.5
Bed Room	27.0	27.0
Kitchen	15.0	12.0
Bath	3.0	3.2
Hall	5.0	5.0
	100.0	92.7

*More radiation was needed for end and upper apartments as they had more exposed surface.

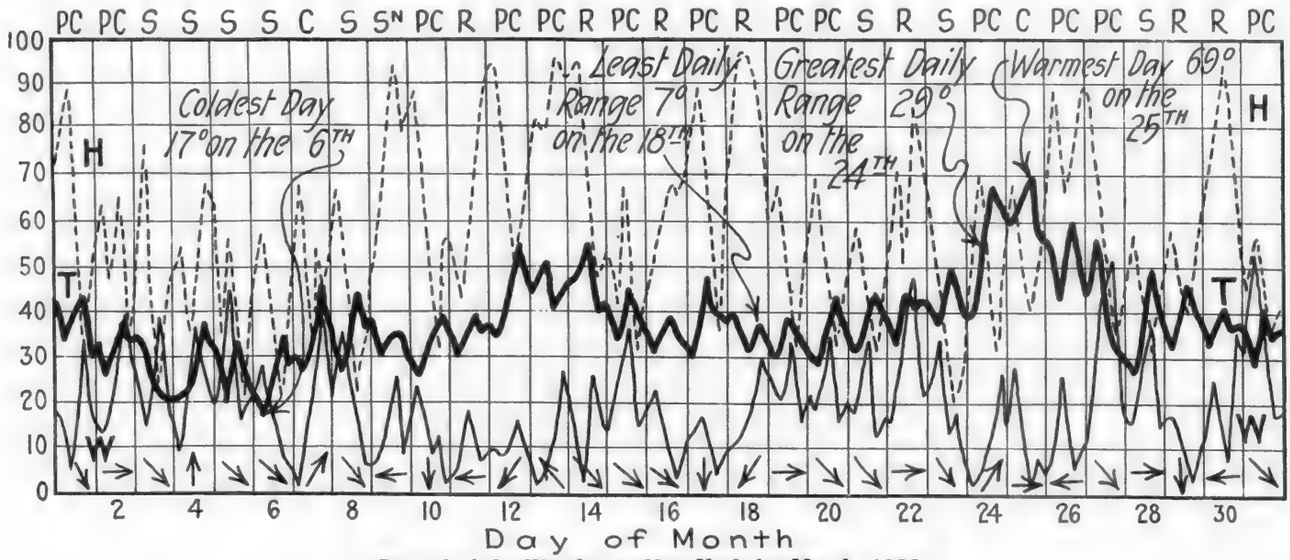


Gas-Fired Boiler and Gas Water-Heater in All-Gas Equipped Apartment House

The Weather for March, 1928

	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, deg. F.	69	70	75	77	81
Date of highest temperature	25	24	13	23	23
Lowest temperature, deg. F.	17	17	15	10	20
Date of lowest temperature	6	4	5	5	5
Greatest daily range, deg. F.	29	36	29	40	30
Date of greatest daily range	24	24	13	23	31
Least daily range, deg. F.	7	7	4	2	10
Date of least daily range	18	18	19	17	8
Mean temperature for month, deg. F.	38.3	37.0	38.6	36.9	46.0
Normal mean temp. for month, deg. F.	37.7	35.5	39.6	35.3	44.1
Total precipitation, this month, in.	2.54	1.56	4.25	1.50	2.27
Total snowfall, this month, in.	*4.8	6.5	9.4	8.3	0.2
Normal precipitation, this month, in.	3.64	3.57	3.03	2.58	3.38
Total wind movement, this month, miles	12970	7322	8699	8822	8729
Average hourly wind velocity, miles	17.4	10.5	11.7	11.9	11.7
Prevailing direction of wind	N.W.	W.	W.	N.W.	S.W.
Number of clear days	7	8	5	10	13
Number of partly cloudy days	14	14	11	9	11
Number of cloudy days	10	9	15	12	7
Number of days with precipitation	11	9	15	7	6
Number of days with snow	2	3	9	3	One
Snow on ground at end of month, in.	None	None	None	Trace	None

*Includes sleet 0.3 inch.


PC PC S S S S C S SN PC R PC PC R PC R PC R PC PC S R S PC C PC PC S R R PC
Coldest Day 17° on the 6TH
Least Daily Range 7° on the 18TH
Greatest Daily Range 29° on the 24TH
Warmest Day 69° on the 25TH
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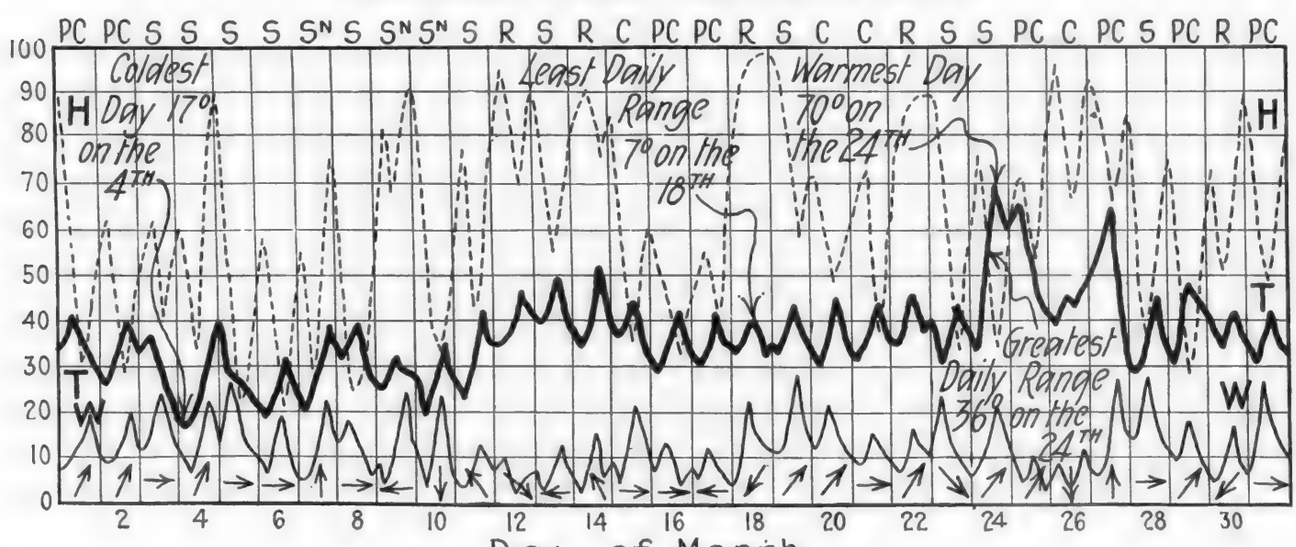
90
80
70
60
50
40
30
20
10
0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in New York for March, 1928
(Hourly Observations of the Relative Humidity Plotted on this Chart)


PC PC S S S S SN S SN SN S R S R C PC PC R S C C R S S PC C PC S PC R PC
Coldest Day 17° on the 4TH
Least Daily Range 7° on the 18TH
Warmest Day 70° on the 24TH
Greatest Daily Range 36° on the 24TH
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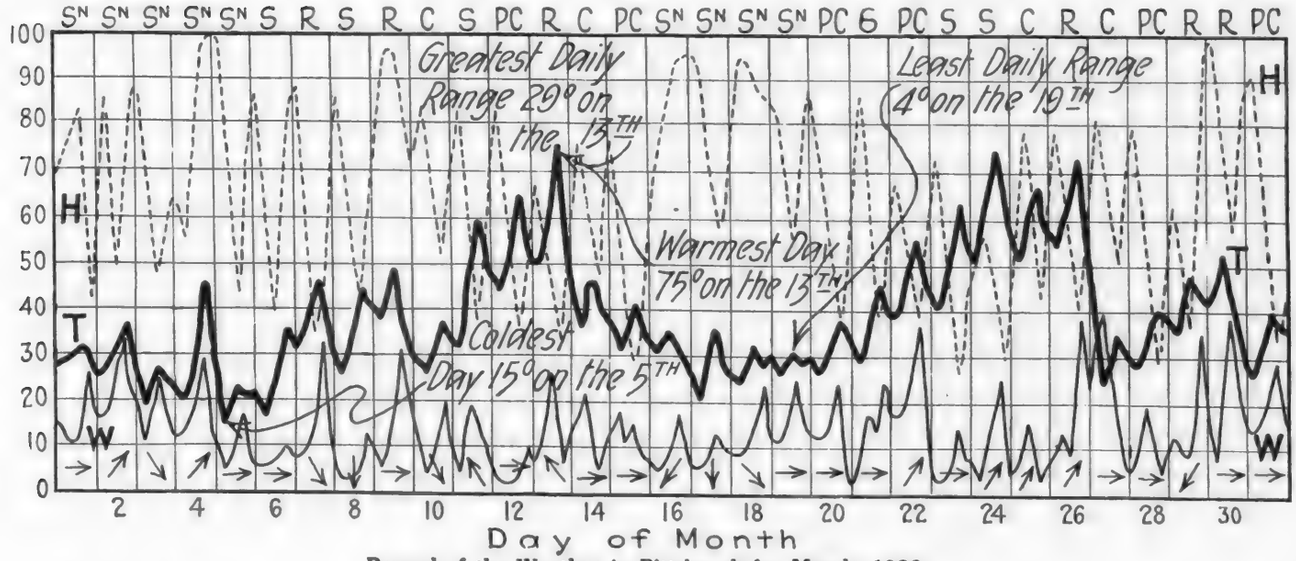
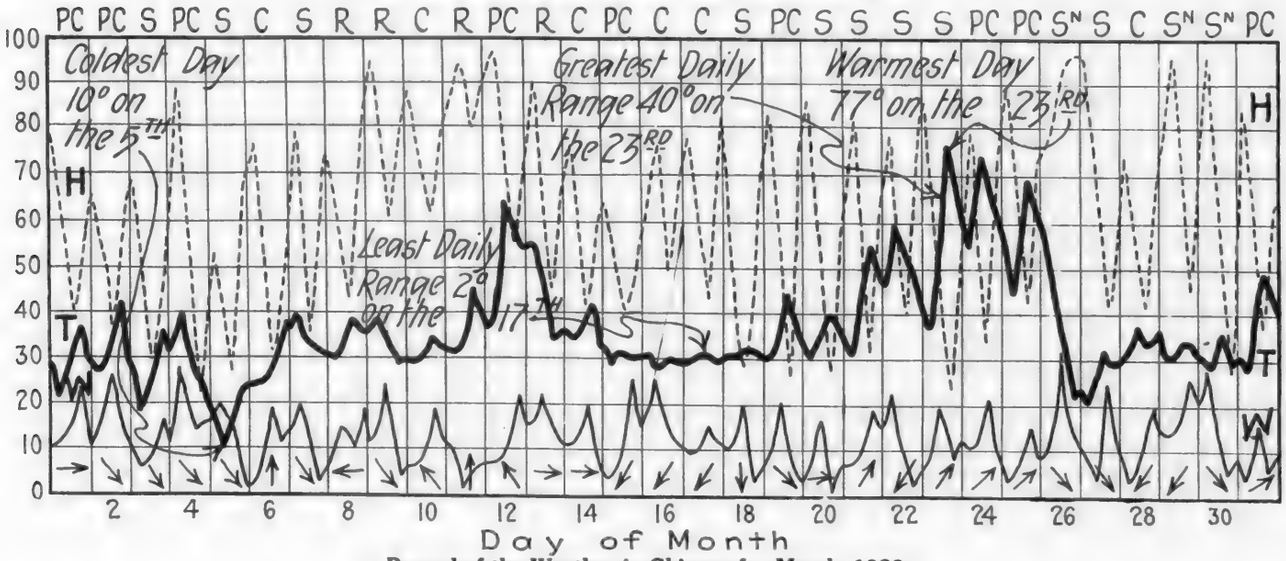
20
10
0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

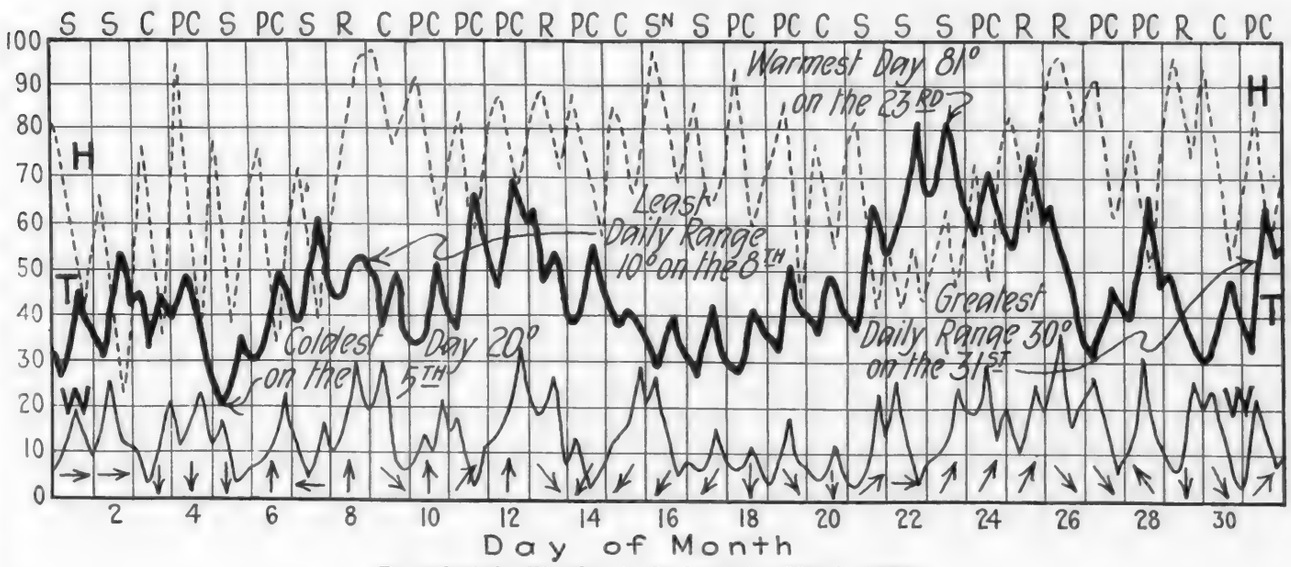
Record of the Weather in Boston for March, 1928


Greatest Daily Range 29° on the 13TH
Least Daily Range 4° on the 19TH
Warmest Day 75° on the 13TH
Coldest Day 15° on the 5TH
Day of Month

Record of the Weather in Pittsburgh for March, 1928


Coldest Day 10° on the 5TH
Greatest Daily Range 40° on the 23RD
Warmest Day 77° on the 23RD
Least Daily Range 2° on the 17TH
Day of Month

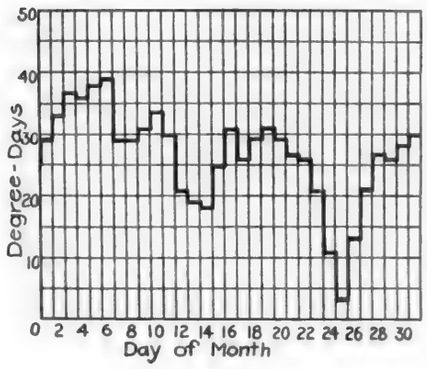
Record of the Weather in Chicago for March, 1928


Warmest Day 81° on the 23RD
Least Daily Range 10° on the 8TH
Coldest Day 20° on the 5TH
Greatest Daily Range 30° on the 31ST
Day of Month

Record of the Weather in St. Louis for March, 1928

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.
Heavy lines indicate temperatures in degree F. Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage from readings at 8 A.M., 12 M., and 8 P.M. Arrows fly with prevailing directions of wind.
S—clear, PC—partly cloudy, C—cloudy, R—rain, Sn—snow.

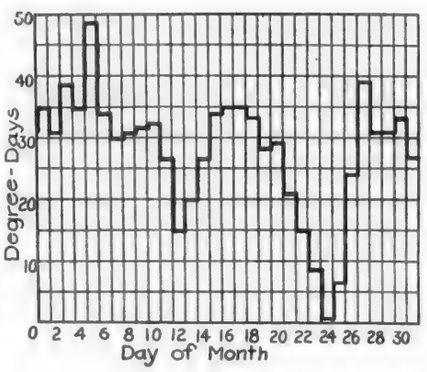
Monthly Heating Loads in Degree-Days In Five Typical Cities



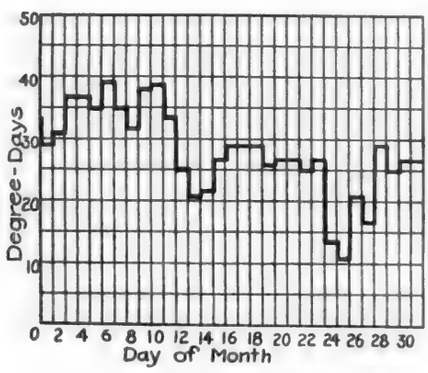
New York, March, 1928
Degree-Days 826—Degree-Days to March 31, 3606

PRACTICAL use may be made of these charts in almost every phase of the heating industry. The first chart appeared in the December, 1927, issue and they will be continued throughout the heating season. They show graphically the heating load in five cities in the United States as typical of the entire range in heating loads.

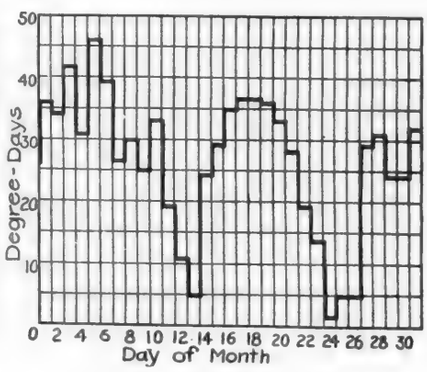
These charts are so drawn that they can be cut out and pasted end-to-end, giving the complete yearly heating load for any of the cities represented. An outline of the method of measuring the heating load by degree-days and illustrations of the varied applications will be found in THE HEATING AND VENTILATING MAGAZINE for September and November, 1925.



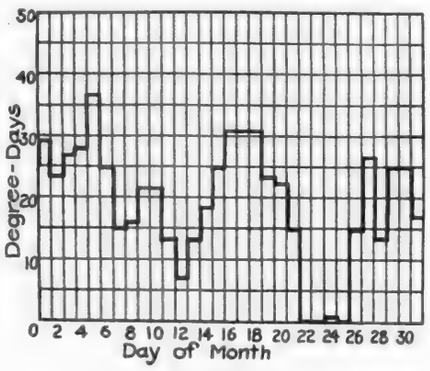
Chicago, March, 1928
Degree-Days 867—Degree-Days to March 31, 4284



Boston, March, 1928
Degree-Days 867—Degree-Days to March 31, 3788



Pittsburgh, March, 1928
Degree-Days 821—Degree-Days to March 31, 3800



St. Louis, March, 1928
Degree-Days 596—Degree-Days to March 31, 3339

Purdue University Initiates Huge Research Program

Announcement is made, by Purdue University, of the appointment of G. Stanley Meikle, to be director of research relations with industry. This is the first step in launching a comprehensive program for research work, to be carried on by graduate students and, where desirable, by highly trained research engineers. Mr. Meikle entered into his new activity on May 1, and carried with him the best wishes of a large army of friends, many of whom were acquired during his connection as eastern representative with the Honeywell Heating Specialties Company.

Born without the proverbial silver spoon, Mr. Meikle worked his way through three years at Worcester Polytechnic Institute, leaving college to become foreman in the electrical cable department of the American Steel and Wire Company at Worcester. He later was promoted to a staff position, but left shortly thereafter to enter Union College at Schenectady, New York, from which he was graduated with the degrees B.E. and M.C.E., both being granted at the same time.

Starting, while at college, with part-time work in the research laboratory of the General Electric Company, Mr. Meikle, after his graduation, began full-time work at the laboratory, directly under Dr. Irving Langmuir. Mr. Meikle remained for several years in this organization, during which time he was responsible for the invention of the hot-cathode rectifying tube and the "Tungar" rectifier.

When the United States entered the war, the Chemical Warfare Service applied to the General Electric Company for a research engineer to direct development and establish production of protective gas-warfare equipment, and Mr. Meikle was personally recommended for this position by President Rice of the General Electric Company. He was made director of the gas mask development department and, with the aid of 168 highly-trained and fixed limited service men, the 1919 model gas mask was developed, tested and accepted by the general staff of the Chemical Warfare Service within a period of twenty days.

After the armistice, Mr. Meikle organized the G. S. Meikle Company, to direct research for small industrial organizations and, during the life of this company he initiated and carried out some extremely interesting projects. After some technical work for mid-western oil-burner manufacturers, Mr. Meikle carried on extensive research in combustion, and was largely responsible for the development of the Silent Automatic burner.

About a year ago he became associated with the Honeywell Electric Specialties Company, as personal representative of its president in the East, and while holding this position Mr. Meikle made a host of friends in the oil-burner industry, and many in overlapping branches of the heating industry.

Correspondence

The Boston School System

EDITOR HEATING AND VENTILATING MAGAZINE:

In your report of the proceedings of the thirty-fourth annual meeting of the American Society of Heating and Ventilating Engineers (page 93, Febuary, 1928 issue), we were quite horrified to find a drastic indictment of the Boston school system by Major J. W. H. Myrick, Boston schoolhouse commissioner. These statements are so absurd to us who know the major that they would be considered humorous were it not for the tragedy you picture. We are asking you to print the following refutation.

Custodians of Boston schools are appointed from a competitive list made up by the Civil Service Board, the highest man being invariably appointed. Appointees cannot fill positions unless having an engineer's or fireman's license for the particular steam plant, or at least, a fireman's license.

Payments to custodians are under the contract system. A survey of net compensation shows that 40% of the men receive $32 a week or less. The highest net payment of a custodian is about equal to the pay of a skilled building mechanic.

The total valuation of all permanent school buildings as given by the Board of Assessors is about $30,000,000. Ten per cent of this is agreed as the valuation of the heating and ventilating apparatus and amounts to $3,000,000. Therefore, if all the heating and ventilating apparatus in the entire school system (including boilers and furnaces) were lying idle, it would amount to but $3,000,000 instead of $6,000,000 as your article quotes.

The Boston school department is particularly free of politics. The school committee of five is free of the mayor's control in the matter of appropriations. They serve without compensation and Boston is indeed fortunate in the type of men and women who are elected to the school committee.

There is no such thing as political expediency in the administration of the Boston schools. The board of schoolhouse commissioners builds and maintains school buildings as determined by the school committee. They are political appointments of the mayor and come and go as mayors come and go. They are the only political appointments connected with the schools and they deal with building alone.

We ask that justice be done the city of Boston by publishing these facts.

JOHN V. DOLE
President, Custodians' Association of the Boston Public Schools.

EDITOR'S NOTE: Reference to the official stenographer's notes of the A.S.H. & V.E. Proceedings shows the discussion in question to have been accurately reported in THE HEATING AND VENTILATING MAGAZINE.

Use of Fans to Increase Effectiveness of Radiators

EDITOR HEATING AND VENTILATING MAGAZINE:

The writer had difficulty in heating certain rooms in his home and one Sunday experimented with an electric fan, blowing air under the radiator, forcing a rapid circulation. In a short while the temperature was raised to 86°.

What effect on the economy of operation would result from setting small electric fans near the radiators to force a circulation? Of course, this may not be practical unless an air duct or a place made for the fan could be fixed so that air would circulate through the radiators. The rate for electricity would certainly enter into the cost.

I will certainly appreciate you giving us some information along this line as I feel sure you have experimented with fans.

Lexington, N. C. R.D.M.

REPLY BY W. A. ROWE, CHIEF ENGINEER, AMERICAN BLOWER COMPANY

There is little information of an engineering nature available other than just the general idea brought out, of increasing the radiating effectiveness of a radiator by air movement.

For example, if you were in a cold room and had an electric disc fan handy, you could discharge the air flow against the radiator and by providing a more rapid air circulation, increase the condensation of steam in the radiator and thereby increase the heat output into the room. Such air movement would probably also distribute the warmth throughout the room more rapidly, so that you would have available a ready means of more rapid heating. It might be that with a radiator of inadequate size on a cold day, you could bring the room up to a comfortable temperature in this way.

However, it should be pointed out that it would not be possible to give any rule as to the extent of this increase, as that would depend entirely upon the design of the radiator, the velocity of the air and, in general, the efficiency of the set-up. If you could enclose the radiator and provide an efficient heating surface comparable to any of the indirect surfaces, it would then be possible to bring the condensation and heat transfer up to those values which we get with that type of apparatus.

Cost of Clean Air for Operating Rooms

Data have been collected by A. E. Nealy, of Midwest Air Filters, Inc., to show the results obtained from the installation of air cleaners in ducts of the forced heating and ventilating system at the University of Michigan Hospital. The filters are of the stationary viscous type and are in service 10 hours each day, except Sundays and holidays. The filters have been in operation for nearly four years, and it is stated that the interiors of the grills on the walls are still free from any collection of dust, which usually accumulates in such places.

The cleaning and operation of the filters is extremely simple and is done by unskilled labor, one-half hour being required to clean the filters each week; five gallons of viscosine are used per year. It is stated that the cost of cleaning the air for 11 operating rooms amounts to 21c per day.

The air intake is 110 ft. above ground and the university is situated in a district free from factory smoke. Seven Midwest type U-2 interchangeable unit filters are installed in the pent house on the roof and over 5000 cu. ft. of air is passed through them per minute. Automatically-controlled tempering coils bring the air entering the operating rooms to approximately 80° F.

One cell out of seven is removed each week, cleaned, dried, re-coated with viscosine and drained. A tabulation of operating costs prepared by the superintendent of the building and grounds department of the university shows that the cost of cleaning the air for the 11 rooms includes depreciation, interest, and an allowance for repairs, plus the operating cost.

Public Building Work in New York State to Relieve Unemployment

Governor Smith of New York, it is announced, has allotted approximately $10,000,000 of public building work to a group of 21 architects who will employ consulting engineers. All of this work is to be contracted for by August 1 of this year.

Approximately $15,000,000 worth of public buildings will be designed by the State Architect's office, also to be contracted for by August 1.

This procedure will provide needed public buildings and at the same time materially reduce the state of unemployment in the building industry within the State.

HIGH PRESSURE is being sent to all heating and plumbing contractors in the vicinity of Chicago by the publicity department of the Chicago Pump Company. Originally intended as a house organ, it has developed into a journal of local trade news.

American Society of Heating and Ventilating Engineers

Plans for Semi-Annual Meeting

PLANS rapidly are being completed for the semi-annual meeting to be held at the West Baden Springs Hotel, West Baden, Ind., June 26-29. • Many excellent papers have been offered and the program will be divided into three main sections. Consideration is being given to domestic heating with oil and gas, to air-conditioning problems, and the subject of research and codes will occupy one session. Following previous practice, business sessions will be held from 9:30 A.M. to 1:00 P.M., the afternoon being free for golf and other diversions.

Hotel rates are on the American plan, including three meals per day, and vary from $7 for a single room to $20 for a double room. C. N. Warren is arranging for the entertainment program and reports plenty of opportunities for amusement and recreation. Two golf courses are available and the research cup now held by Alexander McClintock, Jr., Philadelphia, will be played for on Wednesday afternoon. The various committees, with their chairmen, are as follows:

Committee on arrangements, C. R. Ammerman, Indianapolis, Ind.; reception committee, J. D. Hoffman, Lafayette, Ind.; registration committee, R. W. Noland; hotel and transportation, B. E. LaFollette; entertainment committee, C. N. Warren; ladies' committee, C. H. Hagedon; golf tournament committee, S. E. Fenstermaker; publicity committee, H. C. Murphy, and finance committee, C. C. Shipp.

Council Meets and Chooses Chicago for Next Annual Meeting

At a joint meeting of the council of the A.S.H.&V.E., five members being present, with the directors of the Research Laboratory, and the chairman of the Committee on Research, held at the Union League Club in New York, March 28, it was decided to hold the annual meeting in 1929, at Chicago, January 28-31, and also to hold the semi-annual convention in Cleveland, in June, 1929. Those present at the meeting were President A. C. Willard, Urbana, Ill.; Roswell Farnham, Buffalo; John Howatt, Chicago; H. Lee Moore, Pittsburgh; F. B. Rowley, Minneapolis; F. C. Houghten, Pittsburgh, and Samuel R. Lewis, Chicago. The following dates for future council meetings were approved by the directors: In May, Buffalo; June, West Baden, Ind.; September, Pittsburgh, and December, New York.

W. T. Jones, chairman of the finance committee presented his report and the budget for 1928 was approved. Professor Rowley presented the program for the semi-annual meeting, which was approved.

C. R. Ammerman, of Indianapolis, Ind., was chosen chairman of the committee on arrangements for the semi-annual meeting to be held in West Baden, Ind., June 26-29; J. F. McIntire, of Detroit, was appointed chairman of the committee on increase of membership; a committee of three was selected to draft new regulations covering membership in the society, to take care of any necessary amendments to the constitution, this committee being W. H. Driscoll, of Long Island City, H. P. Gant, of Philadelphia, and Fred R. Still, of New York.

S. R. Lewis, chairman of the Committee on Research, was given several requests for studies on pipe sizes for vacuum heating systems, pipe sizes for hot water heating systems and test methods for radiation.

Boiler Rating Committee Meets in Pittsburgh

The committee on the rating and selection of low-pressure heating boilers met with engineers representing manufacturers of heating boilers at the Pittsburgh station of the U. S. Bureau of Mines, April 9-11, 28 committee members and engineers being in attendance. The objective of the meeting was to consider the engineering and technical features of the proposed rating code and to discuss methods of testing heating boilers. The committee desired to have the advice and help of engineers representing boiler manufacturers and also to give them an opportunity to discuss common problems.

In order to facilitate discussion, the committee had prepared a booklet which analyzed the problem in a logical manner, beginning with the principles underlying the placing of boiler outputs on a comparative basis covering the various factors involved and leading up to the methods and details of tests. The committee desired that the discussion be free, and announced that the opinions of the delegates would not be considered as binding their firms but rather as an effort to perfect the code from an engineering standpoint.

The committee reports that it was greatly helped by this conference and believes that the full discussions that occurred had created a more common viewpoint. Some of the delegates expressed the opinion that still further benefit would result when they have had an opportunity to discuss with their firms the points brought up at the conference. The following were present and took part in the proceedings:

C. E. Oldacre, Gurney Foundry Co., Ltd.; S. K. Smith, H. B. Smith Company; W. B. Russell, The Heggie-Simplex Corporation; J. A. Waddell, Spencer Heater Company; G. W. Nigh, Coatesville Boiler Works; Carl H. Flink, American Radiator Company; Frank B. Howell, American Radiator Company; C. E. Bronson, Kewanee Boiler Corporation; J. F. McIntire, U. S. Radiator Corporation; T. E. Landvoigt, National Radiator Corporation; T. D. Casserly, Weil-McLain Company; L. R. Taylor, International Heater Company; James Neil, International Heater Company; W. F. Goodnow, Pierce, Butler & Pierce Mfg. Company; Chas. A. Maue, Richardson & Boynton Company; R. V. Frost, Frost Laboratory; R. L. Newcomb, Fitzgibbons Boiler Company; L. C. Frohreit, Oil City Boiler Works.

For the A.S.H.&V.E., the following were in attendance: Alfred Kellogg, F. C. Houghten, L. E. Seeley, S. R. Lewis, Percy Nicholls; G. M. Getschow and H. M. Hart representing the committee on selection of low pressure heating boilers; L. A. Harding and A. A. Adler for the committee on code of minimum requirements for the heating and ventilating of buildings, and Prof. S. E. Dibble for the technical advisory committee on chimneys.

The A.S.H.&V.E. committees on rating and selection of low-pressure heating boilers are as follows:

Original committee, Alfred Kellogg, chairman, P. Nicholls, F. C. Houghten, L. E. Seeley, Samuel R. Lewis, G. M. Getschow, H. M. Hart, W. L. Fleisher.

Chimney selection committee, J. R. McColl, chairman, D. Knickerbacker Boyd, Frank Howell, J. S. McIntire, J. H. Walter, Prof. S. E. Dibble, Prof. A. C. Willard.

Load determination committee, D. S. Boyden, chairman, L. E. Seeley, secretary, Arthur S. Armagnac, William S. Baldwin, William H. Driscoll, H. B. Gant, James F. McIntire, Webster Talmadge, W. L. Fleisher.

Illinois Chapter Has Big April Meeting

At the April meeting of the Illinois Chapter, held at the Hotel Sherman, Chicago, April 9, 103 members and guests were present. Willis H. Carrier spoke on "The Possibilities and Future of Thermal Engineering," a talk which illness had prevented his giving at the March meeting.

Mr. Carrier made the suggestion that heating and ventilating engineering was

merely one of the closely related branches of thermal engineering, to which also belonged the refrigerating engineer, the power plant engineer, and the combustion engineer; that this in reality is just as distinct and dignified a profession as electrical engineering, for example, and even more appealing to the imagination.

The thought was advanced that most branches of thermal engineering, particularly pertaining to heating and ventilating engineering, have been for a long time moving along the same track of endeavor to a point at which the limit of improvement has practically been reached, and that by analogy it should be expected there should be some radical change in the nature of improvements in this field; that the industry should "jump over" from one track to another, so to speak, in which the possibilities of improvement were more promising, similar to the radical change which took place in substituting electric light for the oil lamp or the gas flame, or the steam turbine for the steam engine. Various possible fields for such improvements were discussed.

CONCEALED RADIATION PAPER PROVOKES COMPREHENSIVE DISCUSSION

The scheduled paper for the evening was "Concealed Type Radiation," the joint efforts of P. D. Bennett, of the Trane Company; J. H. Milliken, of Circulair Company; G. A. Leach, of the Rome Brass Radiator Corporation; H. G. Harries, of the Modine Manufacturing Company, and G. F. Smith of the Herman Nelson Corporation. The paper was read by J. M. Robb of the Herman Nelson Corporation and consisted essentially of a carefully prepared history of the evolution of radiators. Mr. Robb quoted the late Major E. R. Pierce, of Boston, as authority for the statement that the first installation of steam heating in the United States, was the plant installed by Nason and Walworth in the Eastern Hotel, Boston, in 1853. He then followed the development of radiation from this beginning, with parts made in England, through the Mills and Bundy types, the former being the forerunner of the indirect radiator with fin or pin surfaces. He told of early attempts to build sheet iron and tin radiators and of the trend toward pipe-tube radiation.

Mr. Robb discussed piping problems with concealed radiators, and analyzed the diffusion or heating effect that could be obtained with them. He then spoke of the menace of dust and said that, as the result of certain experiments carried out in Germany, many hospital authorities in that country refuse to permit anything but hot-water heating. Concluding, Mr. Robb said: "The universal demand for concealed radiators has brought them to stay with us as certainly as electric lights, the telephone, and the automobile. Like anything else, fabricated by human hands, the concealed radiator will always have the same defects that any human production has. Concealed radiator units introduce an entirely new set of considerations for the designer, and a great deal must be learned about their performance before their complete functioning accurately can be predetermined."

Michigan Chapter

Detroit Edison Company was host to 125 members and guests of the Michigan Chapter, Monday evening, April 16, when the guests were taken through the Detroit Edison Beacon Street plant, and afterward served a delightful dinner in the dining room at the Detroit Edison building.

Following the dinner the business meeting was held in the assembly room. Past-President McColl presented treasurer Harry A. Hamlin with a gold watch-fob as a token of appreciation of the Chapter for his faithful services from 1917 to 1928. William T. Harms spoke briefly of some of the set-backs encountered by the smoke abatement committee in failing to get support from various railroads entering Detroit. President Calvert introduced J. H. Walker, assistant chief engineer of the Detroit Edison Company, who gave an interesting lecture, with slides, telling how the second largest central steam system in the world furnishes Detroit with heat, power and electricity.

A rising vote of thanks was given to Mr. Walker for his paper, and to the Detroit Edison Company for its hospitality.

Questions and Answers on Electric Water Heating

An exceedingly well-prepared manual for salesmen has been prepared by Hynes & Cox Elec. Corp., Albany, N. Y., manufacturers of Red Crown electric water heaters. This manual is compiled to enable salesmen to answer, quickly and intelligently, many of the questions asked in regard to heating domestic water by electricity.

The manual first describes the Red Crown heater, which consists of a cylindrical steel tank, fitted with sealed heater tubes, circulating ducts, heating element, a thermostat and a heat trap on the hot-water outlet. The tank is covered with a thick layer of material, outside of which is a sheet-metal casing finished in gray enamel. A thermostatic control provides one of the factors insuring high efficiency in operation. The manual is compiled in the form of questions and answers and contains many useful data on the hot-water requirements for different purposes and for various sized families. The manual deals with approved methods of wiring and of connecting this electric heater for use supplementary to heating coils in the heating plant.

Under the caption "Comparisons With Other Fuels," it is stated that electricity at 1.6c per K.W.H. will cost the same as gas at $1.25 per 1000 cu. ft. Several pages of diagrams show typical piping plans for connection with water backs and furnaces.

District Heating School at Purdue

An intensive course on subjects of interest and value to those engaged in district heating, will be held at Purdue University, Lafayette, Ind., May 21-26, inclusive. This course is promoted by and under the auspices of The National District Heating Association and follows a preliminary course held last year. Two simultaneous sessions will be held. Course I deals with the more fundamental subjects and preferably should be taken by those who did not attend last year's course; course II covers more advanced and applied subjects. Applicants should have a grade-school or high-school training but need not be college graduates. The subjects will be arranged to the best advantage of the students, and the classes will be small enough so that a certain amount of individual instruction will be available. Membership in the N.D.H.A. is not required. The courses are as follows:

COURSE I

Heat and the properties of steam.
Heat losses from buildings.
Various types of heating and ventilating systems.
Design of heating systems.
Flow of steam in pipes.
Trends in steam power plant design and operation.

COURSE II

Underground construction (including heat losses).
Distribution system design.
Operation of building heating systems.
Reducing valves, traps and other appliances.
Meters and rates.
Estimating heat consumption of buildings.
Trends in steam power plant design and operation.

A charge of $10 for the week's tuition will be made by the university, this being less than the actual cost of carrying on the school. Detailed information regarding the course should be addressed to Prof. C. H. B. Hotchkiss, Purdue University, Lafayette, Ind.

Detroit Engineering Society Publishes Brochure

Under the title "What of the Future?" the Detroit Engineering Society publishes an interesting booklet outlining its genesis and growth and formulating pertinent questions as to its future. There also is presented a report of the housing committee recommending material expenditures to provide for additions to the club's quarters. The club is composed mainly of local members of nearly twenty national organizations and has grown from 365 members in 1923, to 1618 members in 1928.

Heating and Piping Contractors National Association

Plans for 39th Annual Convention

THE thirty-ninth annual convention of the Heating and Piping Contractors National Association will be held in the Bellevue-Stratford, Philadelphia, June 4-7. On the first day the board of directors will hold its last meeting of the year and members and guests will register. In the evening will be the "Old Guard" dinner, where the oldtimers will gather as the guests of the directors and swap stories of former years. There also will be a get-together party for the delegates and their friends.

COMMITTEE REPORTS TO SHOW MATERIAL PROGRESS

Among the high lights of the convention will be the presentation of the spring labor survey containing important data on labor conditions, that always are vital to the contractor; Russell G. Creviston, manager of the Plumbing and Heating Industries Bureau, will tell of the program on which the bureau is embarked to stimulate sales of heating installations and plumbing equipment; the report of the committee on text books will be made by V. L. Sheldon, of St. Louis, chairman. This committee has prepared a book on steam fitting for use in training classes of boys who are learning the steam-fitting trade, and every endeavor will be made to issue it in as perfect form as possible; George M. Getschow, chairman of the sub-committee on boiler output, hopes to bring the work of his committee to a conclusion, and a spirited discussion of the report is anticipated; Edward G. Byrd, recently appointed as field representative, will tell the members of his visits to various parts of the United States, during which he has accumulated much valuable information. The program is as follows:

TENTATIVE PROGRAM OF SESSIONS AND ENTERTAINMENT

Monday, June 4, Morning Session, 10:00 A.M., meeting of the board of directors. Afternoon Session, 2:00 P.M., registration of members and guests. Evening Session, 6:30 P.M., "Old Guard" dinner; 8:30 P.M., get-together party and dancing.

Tuesday, June 5, Morning Session, 9:00 A.M., opening session, address by Hon. H. A. Mackey, Mayor of Philadelphia; president's address—Harry M. Hart; convention photograph; presentation of spring labor survey; appointment of convention committees; address by Russell G. Creviston, manager of the Plumbing and Heating Industries Bureau; reports of the following officers: Walter Klie, chairman of the board of directors; Henry B. Gombers, secretary, and Horace W. Jones, treasurer. Following an address by John C. Howell, the meeting will be thrown open for discussion of any subject of interest to the heating and piping industry. At 2:30 P.M., there will be a river trip to League Island, United States Navy Yard, and in the evening a dinner-dance, with an address by Dr. E. J. Cattell.

Wednesday, June 6, Morning Session, 9:00 A.M., on certified heating and standardization; report of committee on text book, V. L. Sheldon, chairman; for membership committee, E. W. Verity, chairman; for committee on standardization, Ralph S. Franklin, chairman; for sub-committee on boiler output, George M. Getschow, chairman; for committee on certified heating, Herbert A. Snow, chairman, and report of field work by Edward G. Byrd, field representative. Then an open discussion of any subject of interest. At 2:30 P.M., there will be a trip to Valley Forge in motor buses, and in the evening a theater party for ladies and a smoker for the men.

Thursday, June 7, Morning Session, 9:00 A.M., business session. Report of secretaries' conference, Louis T. Braun, chairman; papers by secretaries; address by E. L. Flentje, and reports of general business matters. At 2:30 P.M., there will be a meeting of the board of directors, while the members will go to the Manufacturers' Country Club for golf and cards.

Cleveland Heating Men on Inspection Trip

Under the auspices of the Heating and Piping Contractors Cleveland Association, more than fifty contractors, engineers, and architects left Cleveland in two special Pullman cars the night of Monday, March 26. The first stop was at Michigan City, where the party proceeded to the Weil-McLain Company's plant. Isadore Weil, W. R. Stockwell, T. Casserly, C. F. Newport and S. W. Howard greeted the party for Weil-McLain. An inspection tour of the plant was made, after which a demonstration was given of a smokeless boiler in the laboratory, under the direction of Thomas Casserly, research engineer. Phil Sprague, president of the Hays Corporation, was present and demonstrated the Hays draft gauge and other instruments.

Traveling to Chicago, the group was met by a delegation from the Illinois Engineering Company, and conducted to the plant of this company. After a greeting by G. L. Harris, and J. L. Ehretsman, demonstrations of high and low-pressure equipment were conducted for the party which also studied the manufacturing processes.

The party then attended, as guests, the regular monthly meeting of the Chicago Master Steamfitters' Association. A dinner was served, vaudeville and musical entertainment was provided, following which a joint meeting was held. Two hundred and thirty people were in attendance and the speaker of the evening was former governor of Minnesota, A. O. Eberhardt, who spoke on "Good Citizenship."

At the close of the meeting the party returned to the Pullmans which left during the night for Kewanee, Illinois.

Wednesday began with an inspection trip to the Kewanee plant after which the party entrained for Waukegan, where the cars were shunted to a siding at the Pacific Boiler Company plant. A dinner and entertainment program was given at the Golden Gate Country Club.

On Thursday morning, the party was taken on an inspection tour through the plant of the Pacific Boiler Company, after which it left for Milwaukee in time to arrive for luncheon at the Milwaukee Athletic Club.

Following the luncheon, an inspection was made of the plant of the Johnson Service Company which was completed

Members of Heating and Piping Contractors Cleveland Association Inspect Many Large Plants

in time for the party to arrive in Chicago for a theatre party, after which the Pullmans left for Cleveland.

The trip was voted a huge success due to the cordial receptions along the line and to the carefully worked out plans of A. R. Herske, manager of the Cleveland association, who initiated and managed the tour.

Certified Heating Campaign to Be Repeated

Based upon reports of its field representative, Edward G. Byrd, the Committee on Certified Heating, of the Heating and Piping Contractors National Association, is arranging to duplicate its recent direct-mail advertising campaign. The new campaign will consist of two distinct parts, one of which will explain certified heating to the architects, engineers, builders, realtors and loan dispersing agencies; the other will be designed to increase the activity in the replacement field. This decision was reached at a meeting of the committee, held at the National headquarters in New York, March 21-22. The meeting was attended by Herbert A. Snow, of Boston, chairman; W. D. Emery, Brooklyn; Thomas Gale, St. Louis, and A. R. Herske, Cleveland.

Certified heating has come to occupy such an important place in the program of the national association and its various local associations, that it will be given a prominent place on the program of the association's forthcoming annual convention in Philadelphia, June 4-7. In this convention the association will equip a model certified heating booth, so that the local associations planning to put booths in "Own-Your-Home" shows will have the benefit of the ideas of the committee in planning and conducting these booths.

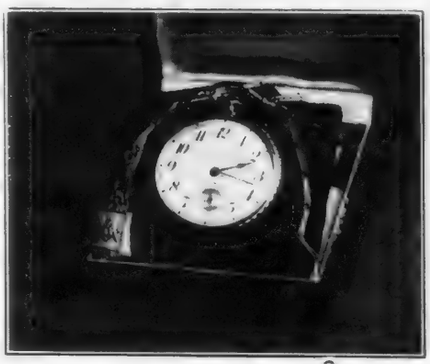
Other subjects discussed by the committee were modern merchandising methods as applied to the heating and piping contractors' business.

New York City Association Re-elects Officers

At the annual meeting of the Heating and Piping Contractors New York City Association, held March 27, the following officers were re-elected: President, H. Richard Stern; vice-president, Robert B. Miller; treasurer, Robert D. Williams; secretary, Henry B. Gombers, and executive secretary, William E. Taylor. The board of directors consists of the president, vice-president, treasurer, R. B. Purvis, and one new member, Walter Geoghegan, elected at this meeting.

Newark Association's Beefsteak Dinner

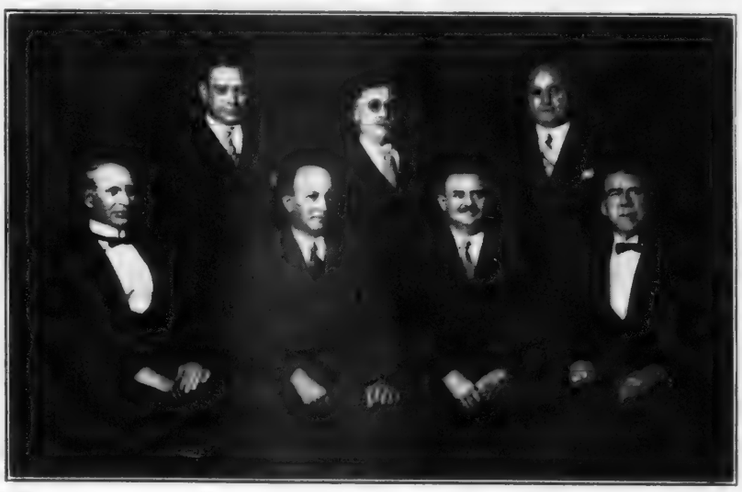
Heating and Piping Contractors Newark Association held its annual dinner at the Washington Restaurant, April 11.



Testimonial Watch Presented to Harry Geiser, Long-Time Secretary H. & P. C. Newark Association

Over 300 were present, the entire metropolitan district being represented. The feature of the dinner was the presentation, by Thomas D. Cryer, of a gold watch to Harry Geiser, for his long service as secretary of the association.

Mr. Geiser, who is one of the few licensed heating engineers in the Newark territory, for the past 35 years, has conducted a heating contracting business at 248 Plane Street, Newark, under the name of Theo. Geiser & Sons, Inc. It was largely through Mr. Geiser's efforts that certified heating was adopted by the Newark association.



Committee on Arrangements, H. & P. C. Newark Association Annual Dinner

Back Row, Royal S. Smith, George Dennis, Fred Engelberger. Front Row, Harry Geiser, John Keller, John Nellis, T. B. Cryer. Ambrose Walsh, prominent member of this committee was not present when this picture was taken.

Samuel Rea Visualizes Fuel 50 Years Hence

On the occasion of the fiftieth birthday of the Engineers' Club of Philadelphia, Samuel Rea, retired president of the Pennsylvania Railroad, painted a vivid picture of the fuels of the future.

"It is my own guess," said Mr. Rea, "that some of the most notable achievements of engineering in the next 50 years, perhaps overshadowing all others in importance, will have to do with the conservation of our natural resources, particularly in the direction of eliminating waste in the use of fuels and in recovering and utilizing more completely the by-products of distillation and combustion.

"We all are familiar with the predictions and estimates that our supplies of oil and anthracite coal are doomed to exhaustion in a few decades. If this is so, where will we stand in 1977 for these fuels? We believe that we have bituminous coal in sight for several centuries, but we need more than this and every effort of the country's best engineering minds is needed to restrict the waste of our valuable heat and power producing commodities.

"Sometime in the future, perhaps by 1977, if not earlier, we may conceive that all small and inefficient plants will be closed down and heat and power obtained from central plants where production costs are at a minimum. Certainly this is both possible and practicable in cities and even in closely settled suburban or country districts.

"The utilization of fuels is a specialized branch of engineering. Fuels are destined to become so valuable to the human race as a whole that they will be placed only in the hands of those who can to the greatest advantage control their combustion. Scarcely anything is more archaic in our civilization, or more wasteful in the eyes of the economist, than our individual house-heating systems, in which all but a small fraction of the potential heat of the fuel is dissipated upon the outside atmosphere.

"The gas business, as a public utility, will supply practically all heat distribution in urban localities. As capital cheapens, it will become possible to construct distributing systems for furnishing cheaply produced gas for house heating purposes as well as cooking. Industries in many cases will similarly be supplied with gas for fuel instead of burning coal in individual furnaces under boilers. We then may realize the smokeless city, and added sunlight will greatly improve the health of urban dwellers."

Plumbing and Heating Industries Bureau

Intensive Campaign for New Business in Philadelphia

Under the auspices of the newly organized Plumbing and Heating Development League of Philadelphia, a campaign has been initiated to stimulate business for the heating contractor and the master plumber and to determine, in an experimental way, how much business can be developed and at what cost. A field has been adopted for the league and will be available to contractors and plumbers participating in the campaign. Dominant newspaper advertising is designed to formally establish the standing of the heating contractors and master plumbers in the minds of the buying public.

Intensive courses will be held, designed to train members in sales work and in developing business. A comprehensive sales training program also has been worked out for journeymen as it is well known that they can be of more value in initiating new business. The campaign will include the direction of direct mail material and the development of show and display-window survey.

Inauguration of Rehabilitation Campaign

The first gun in the campaign, instituted by the Plumbing and Heating Industries Bureau to stimulate reconstruction work in homes, was fired in the shape of a page advertisement in *The Saturday Evening Post* for April 28. The plan formulated contemplates a systematic survey of homes to make sure that heating and plumbing equipment are adequate and in first-class order.

It is contemplated that each heating contractor participating in this movement will address all possible clients, on his own letterhead, requesting an opportunity of explaining the simple tests by which this examination is made, and assuring the readers that he or she is under no obligation in asking fully and clearly about the health conditions in their home, from the standpoint of heating and plumbing equipment. The bureau presents a carefully-worked out plan for making such a health examination, among which are the following:

"Does the home you are examining need additional plumbing and heating equipment? Does it need these things: a water heater; heat for the garage; more radiation for the home; insulation for the heating system; thermostatic control for the heating system?

"Does the home have obsolete heating and plumbing equipment and need these things: new grates, a new boiler, new radiator valve or new air valves for the radiators; and lastly, does the boiler need new sections, do the radiator-valves need repacking, do the radiators need new sections or new nipples and does the heating system need a general overhauling?"

It would appear that this campaign has been worked out with great care, that it is pertinent to health in the home and that it should have the unqualified backing of all heating contractors.

Philadelphia Sales Campaign

The April monthly service bulletin of the Plumbing and Heating Industries Bureau is designated as the national advertising number and is devoted to a story of the Philadelphia campaign, and of the national drive inaugurated in the *Saturday Evening Post* of April 28. This little publication is full of excellent suggestions to the heating and piping contractor and plumber.

Bureau Establishes Pacific Coast Branch

At a meeting held at the Palace Hotel, San Francisco, the members of the plumbing and heating industries on the Pacific Coast formulated a plan for the establishment of a Pacific Coast branch of the Plumbing and Heating Industries Bureau and elected an advisory committee under which the program will be prosecuted. There have been formed four State or district committees of twelve members each, comprising six retailers, three wholesalers and three manufacturers. Three members from each group will constitute the West Coast Advisory Committee. It is understood that a fund in excess of $16,000 has been subscribed and that $6,000 more will be available, if necessary.

Edward Looker, formerly secretary of the California Sanitation Development League of San Francisco, was appointed manager and will have headquarters in San Francisco. A field force is being trained at the Industries Bureau headquarters at Evansville, Ind., from which two men will be sent to San Francisco, for a short period, following which one will go to Tacoma and one to Los Angeles.

STANDARD TEXT ON STEAM-FITTING has been published by the Apprenticeship Service Department of the Plumbing and Heating Industries Bureau, Evansville, Ind., for use in the course of apprenticeship instruction mapped out by the bureau. The text is arranged in eight groups, taking up in sequence the steamfitter and his opportunities, the steamfitter learner as a team-worker, tools and materials, mechanics of steam-fitting trade, plan reading and sketching for steam-fitters, various heating systems, arithmetic for steam-fitters and science for steam-fitters. Undoubtedly, the book will fill a long-felt want. The text is clear and explicit, besides being thoroughly up to date. Among other things, the book contains, in full, the method of figuring radiation put out by the Heating and Piping Contractors National Association, as well as the pipe-capacity tables on which the H. & P.C.N.A. and the A.S.H. & V.E. recently have co-operated. In addition to these tables the book contains some 60 pages of tabular matter, which will make it of permanent value for reference purposes.

The text may be purchased in four different forms. In the first, or pamphlet form, each unit or job sheet of the text is a separate pamphlet. Tagboard covers are furnished in which the pamphlets making up each group may be bound. Price, $4.50. The second form is the same as the first except that a three-ring leather binder is furnished to hold the pamphlets of the entire text. Price, $6.00. The third form of the text is bound in paper in groups. In this style each group is bound in a flexible cardboard cover, making individual volumes of the entire text. Price, $4.50. The fourth form of the text is bound in cloth in one complete volume, priced at $5.00. Size, 5⅛-in. x 8½-in. Pp. 432, including index.

New French Journal on Heating

A new journal entitled "La Chaleur, L'Air, L'Eau," described as a monthly review on the subject of heating, ventilation and plumbing, has been inaugurated in Paris, France, by M. Loubat, formerly editor of *Chauffage et Ventilation*, the monthly bulletin of the French association of heating and ventilating engineers. The first issue is dated January, 1928. Among the subjects discussed in this issue are fundamentals of heating, kitchen ventilation and the use of process steam.

Legal Aspects of Trade Association Statistics

A comprehensive legal survey of the legality of statistical reporting as a trade association activity, has been prepared by Benjamin S. Kirsh of the New York City Bar, formerly special assistant to the United States Attorney in New York in the prosecution of Sherman Anti-Trust law cases. The paper is comprehensive in its scope, critical in analysis and should be generally and carefully read by manufacturers interested in association activities. It is available and reprinted from the March, 1928, issue of the American Bar Association *Journal*.

Present Practice in Vapor Heating

Previous articles in this series are:

1. *Webster Type R Modulation System, August*, 1926.
2. *Dunham Home Heating System, August*, 1926.
3. *The Illinois System, September*, 1926.
4. *Hoffman Controlled Heat, September*, 1926.
5. *The Mouat System, October*, 1926.
6. *The Trane System, November*, 1926.
7. *The Sarco System, December*, 1926.
8. *The O-E Perfect 3-in-1 System, January*, 1927.
9. *The Gorton System, February*, 1927.
10. *The Barclay System, May*, 1927.
11. *The Richardson System, June*, 1927.
12. *The Barnes & Jones System, July*, 1927.
13. *The Broomell System, November*, 1927.

14. The Hutchison System

A TYPICAL circuit-main piping layout for a Hutchison system of vapor heating is illustrated in Fig. 1. This system comprises four essential parts, a modulating valve (Fig. 2), damper regulator (Fig. 3), air eliminator and vacuum valve (Fig. 4), and trap receiver (Fig. 5).

Vapor generated in the boiler passes into the supply main, thence to branches, risers and radiators, until all radiators are completely filled and all air from the radiators and piping has been expelled. The system then can be operated for a period under vapor or even under a partial vacuum. As condensation occurs in the radiators and a vacuum is developed, the condensate passes into the return where it is held by the air eliminator and vacuum valve on the return. Slowly this vacuum reaches the boiler, through the supply lines, with the result that the heated water in the boiler will continue to give off vapor below the atmospheric boiling-point of 212° F.

Setting of the modulating valve is done with the valve in position on the radiator. The dial on top is graduated to agree with change in the port area, in terms of square feet of radiation, by steps of 10 sq. ft., from 10 to 130 sq. ft. The pointer can be moved and locked at the marking corresponding to the total radiating surface of the radiator so that when the valve is open to the stop position, it will admit just enough vapor to permit the entire surface of the radiator to be warmed and condense the vapor before it can pass into the return connection. By opening the valve to any position, from 10 ft. to the maximum for which it is set, vapor is admitted in proportion to the amount of radiating surface needed to meet the demands for heat. The valve illustrated in Fig. 2 is set to admit vapor to supply 30 sq. ft. of radiating surface.

SETTING THE RADIATOR VALVES

Valves on the different radiators are set with the system operating under a maximum demand condition so that all vapor passed by the valve is condensed in the radiator before it reaches the return outlet. Thus, traps on the return side of the radiator are eliminated and a union ell only is used, through which the air and water of condensation pass to the return riser and thence into the return main in the basement. The ½-in. ell on the return side serves to facilitate rapid circulation and removal of air from the radiator at a minimum boiler pressure. Supply valves are made in the ¾-in. size only.

Valves are set permanently with 2-oz. pressure at the boiler, by first closing the valve and loosening the screws hold-

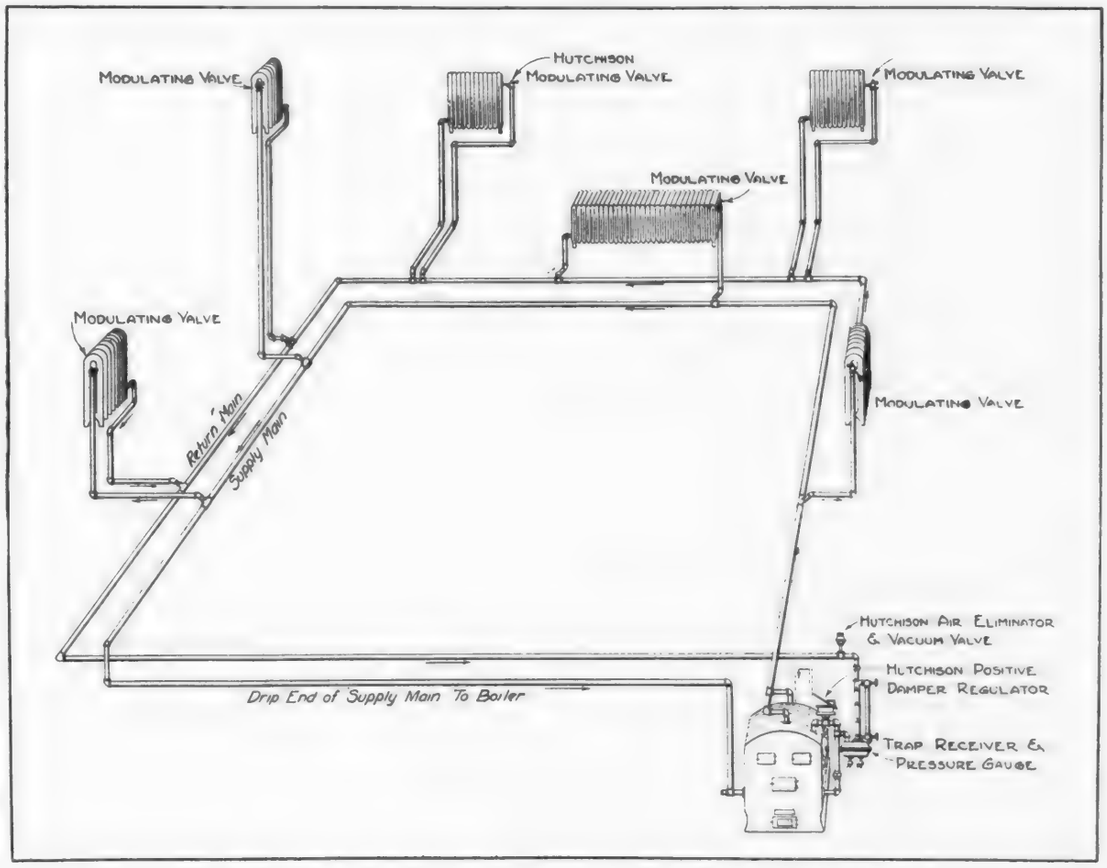
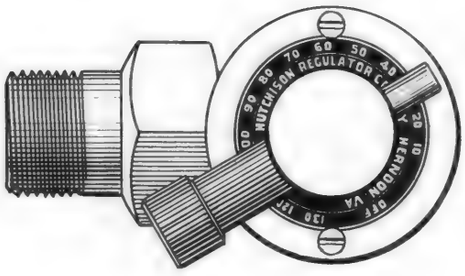


Fig. 1. Schematic Diagram of Hutchison Vapor Heating System



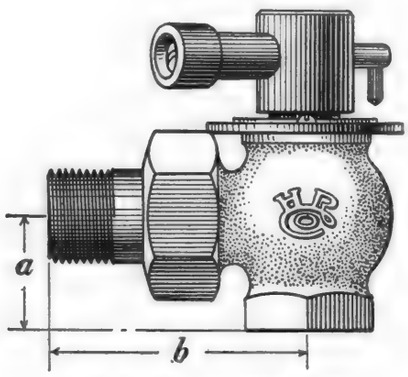


Fig. 2. Modulating Valve

ing the etched disk in place (see Fig. 2), at the same time loosening the screw which holds the handle in place. The etched disk is then revolved until the figure representing the square feet of heating surface in the radiator is directly under the pointer, when it is against the stop post. The handle hub then can be slipped off easily. With the valve held in a shut position, the handle hub is replaced with the pointer directly over the word "off" on the etched disk. All screws are then tightened.

Where it is desired to set the valves for a pressure other than 2 oz. at the boiler, the area of the radiator in square feet should be divided by 0.707, the quotient thus obtained multiplied by the square root of the other pressure in ounces, and this product used at the stop post instead of the actual area.

Extension valve stems are attached, when needed, for use with encased or concealed radiators.

TRAP RECEIVER PERFORMS SEVERAL FUNCTIONS

The Hutchison trap receiver, illustrated in Fig. 5, consisting of a single casting, is designed to prevent water from backing into the returns. It delivers the condensation into the boiler at, or slightly above, the water-line, and acts as an auxiliary safety valve. Its use eliminates the need for check, thermostatic and float valves. When the trap receiver is properly installed on the equalizing column, any accidental rise in boiler pressure causes steam to blow through the seal in the trap, at about 1 lb. pressure, closing the air eliminator and holding the system in balance until the pressure drops, or the cause of the accidental rise is eliminated. Sediment and dirt from the heating system are collected in the lower part of the trap receiver and thus are prevented from entering the boiler. The receiver is suited for use with any standard boiler and requires only 20 in. space between the bottom of the return main at the boiler and the water-line of the boiler (see Fig. 5).

The low-pressure damper regulator is designed to control the boiler pressure within such close limits that the return end of the radiator need be fitted with only the plain open elbow. This regulator (Fig. 3) consists of a sylphon chamber, a vapor inlet valve (1), a thermostatic member, sylphon bellows (2) for actuating a rocker arm (3), an adjustment screw (4), a spring (5), and a balance weight (6).

Vapor enters the channel leading to valve (1) as indicated by the arrows. Meeting the valve cap, it is deflected into the sylphon chamber where it comes in contact with the sylphon bellows (2), the heat causing the bellows to expand. This expansion causes the upper post of sylphon bellows to act on the long end of the rocker arm (3) forcing adjustment screw (4) downwards to strike spring (5). This pressure causes the inlet valve to seat and stop the entrance of more vapor. As the sylphon cools and the pressure lowers, the rocker arm is permitted to drop back, allows the drafts to open and pressure in the boiler again to be built up. Operating pressure is controlled by the weight (6) which may be set in various positions on the rod to establish and maintain any maximum pressure from approximately ½ oz. to 12 oz. Through the action of rocker arm (3) the leverage multiplies the actual vapor pressure so that the force actuating the operation of the damper is powerful enough to assure proper functioning. The thermostatic action of the sylphon assures positiveness and the weight on the beam permits close setting of operating pressure. For oil-burner installations, a cut-off switch replaces the damper rod and weight.

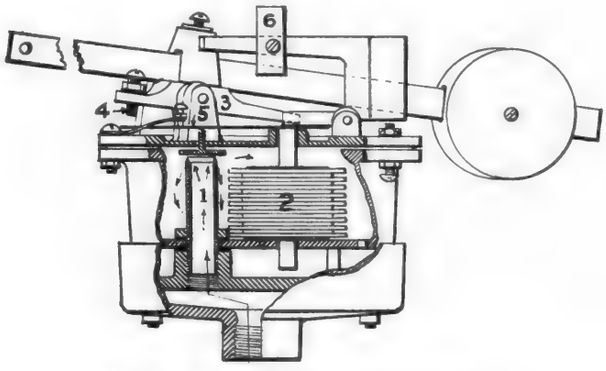


Fig. 3. Hutchison Damper Regulator

HOW THE AIR ELIMINATOR WORKS

The air eliminator and vacuum valve (Fig. 4) is designed with large vent port so as to permit easy and free escape of air from the system and at the same time prevent the escape of vapor and water and assure positive tightness against the entrance of outside air into the system. The size of the float gives large capacity and ample surface for responsive expansive action of the thermostatic member. This eliminator is rated as having a capacity of 1500 sq. ft.

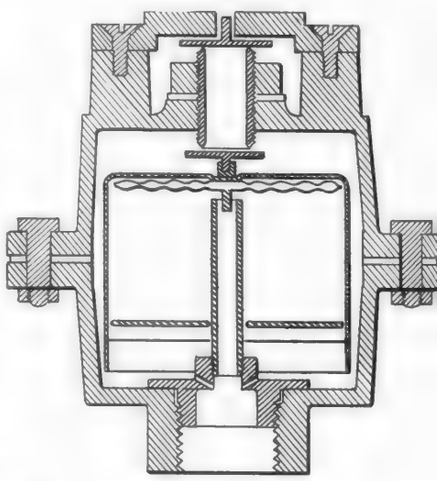


Fig. 4. Air Eliminator and Vacuum Valve

of radiation, but in cases where particularly quick venting is desired, two or more may be used along the return lines. The eliminator is built in only one size, tapped ¾ in.

Generally speaking, three conditions of installation are met in practice, (a) radiation to be supplied is so situated with respect to the boiler that two or more mains must be run from the boiler to suitable distribution points; (b) radiation so situated that one main may be run from the boiler completely around the building and back to the boiler, and (c) obstructions in the form of girders or beams require relays and proper bleeding of supply mains to assure correct functioning of the system.

Under each of the above conditions, the supply riser is carried the full size of the boiler outlet to the first elbow

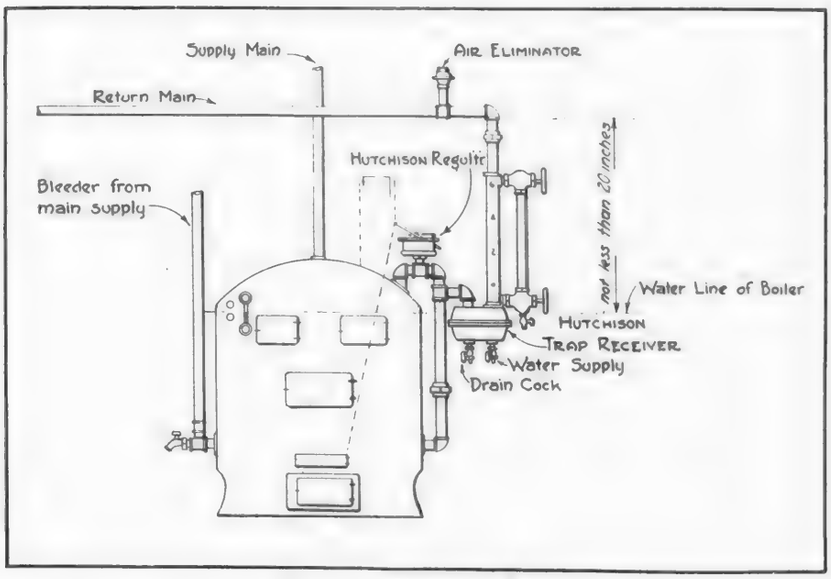


Fig. 5. Assembly at Boiler

or tee before reducing to proper main size, starting high at the boiler, grading down and away therefrom, and returning to boiler below the water line through a bleeder and wet return.

Detailed data as to most practical and economical methods of piping under varying conditions, together with complete tables of pipe sizes, radiation calculation, and general information are included in the *Hutchison Fitter*, which is furnished by the manufacturer to heating contractor and engineers.

As the Hutchison system, in common with similar types of open or atmospheric systems of vapor heating, depends for its function upon free circulation at extremely low initial boiler pressure, its maximum efficiency is best realized by the contractor giving careful attention to proper pipe sizes, grades and connections.

Chauffage et Ventilation to Enlarge Its Scope

Chauffage et Ventilation, the official publication of the French Society of Heating and Ventilating Engineers, published in Paris, France, has been taken over by a company formed exclusively of members of the association. The company has been capitalized at 5000 francs, divided into 50 shares at 100 francs each.

It is planned greatly to enlarge the scope of the publication and 500 copies will be sent gratis each month to architects, engineers and others interested in the field of heating and ventilation. This journal recently enlarged its type page from 6½ in. x 9¼ in., besides adding to the number of its reading pages.

The ambitious plan now being put into effect in connection with the development of *Chauffage et Ventilation* reflects the growing importance of the general field of air conditioning in France.

National Organizations Combine to Produce Class "A" Homes

At a conference, held in Chicago in March, presided over by a representative of the Department of Commerce, prominent national organizations met to develop a co-operative movement for the adoption of national standards in home building for the purpose of certifying Class "A" homes. Alexander Forward, managing director of the American Gas Association, is chairman of the joint committee in the preliminary stage. The participating organizations are the National Association of Real Estate Boards, Architects Small-Home Service Bureau, Heating and Piping Contractors National Association, American Gas Association, American Institute of Architects, Common Brick Association, Portland Cement Association, National Lumber Manufacturers Association, Tile Manufacturers Association.

Home-Modernizing Bureau of the National Building Industries Organized

WHAT leaders in the building industry describe as the greatest concerted movement ever undertaken by the construction interests in the United States was formally launched in Chicago, April 11, when 131 executives of 44 associations, corporations and other factors in the building field established a new organization under the name of the Home Modernizing Bureau of the National Building Industries. This name has been adopted in place of the National Home Building Council, which, as reported in last month's issue, was the name tentatively adopted at a meeting of the same interests in Chicago, March 2.

Necessary funds to get the organization under way were secured. The meeting voted to incorporate an organization, not for profit, elected officers, engaged a secretary, and empowered a committee to open headquarters and to begin work on the task of modernizing the more than twenty million existing homes in the United States.

While the immediate objective is the stimulation for this tremendous volume of remodeling work, speakers expressed the opinion that the following results also would be accomplished:

1. Stimulation of new building.
2. Stimulation of home-ownership.
3. Modernization of all other types of structures besides homes.
4. Persuasion of public bodies to undertake necessary public works programs.
5. Stabilization of prosperity in the building field.
6. Relief of the unemployment situation in the building trades and contribution to general prosperity.

Walter J. Kohler, Kohler, Wis., representing the Plumbing and Heating Industries Bureau, who was chairman of the acting executive committee which sent out the call for the meeting, was elected president and chairman of the executive committee. Other officers elected were:

A. Trieschman, Chicago, National Lumber Manufacturers' Association, first vice-president; Oscar W. Rosenthal, Chicago, National Association of Building Trades Employers and Associated General Contractors of America, second vice-president; Otto T. Salick, Milwaukee, president of the U. S. League of Building and Loan Associations, third vice-president.

George E. Piper of Chicago, of *Household Magazine*, was named secretary by the executive committee at its organization meeting.

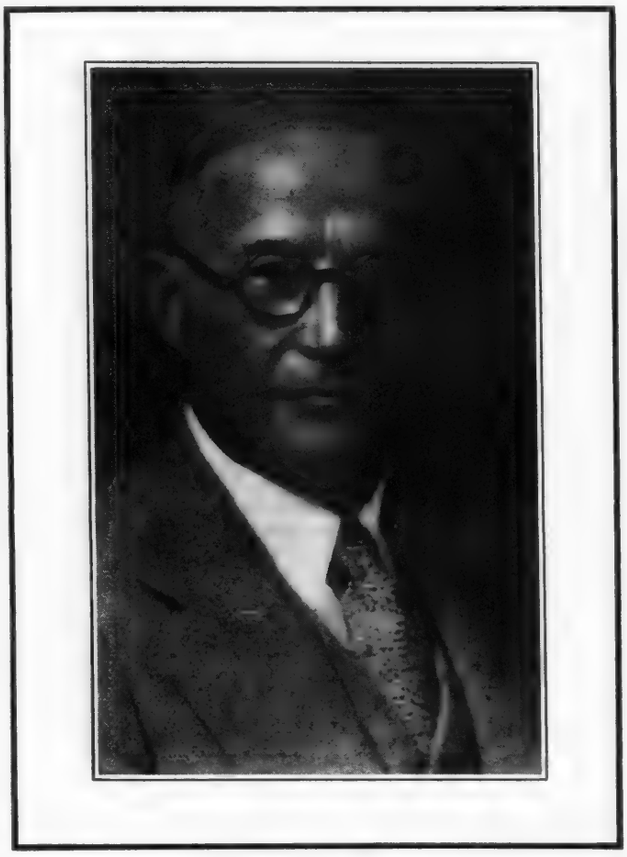
Russell G. Creviston, manager of the Plumbing and Heating Industries Bureau, outlined the definite plan of action which the committee contemplates. It includes appointment of committees on publicity and advertising, local campaigns, home-financing and sales coordination.

Representatives of a number of important groups were chosen as members of the board of governors, including the following: Oil-burner groups, John S. Coonley, Jr., temporary alternate; weatherstrips, Willard S. Smith, St. Louis, director of sales Monarch Metal Weatherstrip Co.; Robert M. Burns, alternate: Plumbing and Heating Industries Bureau; Walter G. Kohler, Russell G. Creviston, alternate: heat by radiator, Charles Foster, vice-president American Radiator Company; W. M. Scudder, vice-president American Radiator Company, alternate: National Association of Heating and Piping contractors; Harry M. Hart, president, alternate.

Death of Walter S. Timmis

THE death of Walter S. Timmis of New York, well-known consulting engineer and architect and a former president of the American Society of Heating and Ventilating Engineers, came as a shock to his many friends in the industry in which he had figured so prominently. Mr. Timmis died suddenly at the Engineers' Club of New York, April 4. He was quite alone at the time and it was not generally known that he had been in poor health.

Mr. Timmis was a native of England, where he was born in 1870. His early technical education was obtained at the Wolverhampton Technical School of England. He came to the United States in 1891 and established the pattern shops and foundry supply business of Timmis & Clissold, Bound Brook, N. J. This business is still active.



Walter S. Timmis

During the period from 1891-1898, Mr. Timmis specialized in designing printing, lithographing, typesetting and stereotyping machinery, taking out several important patents in that field. He also devoted considerable time to the development of coal handling machinery, engines, pumps and steam specialties. Later, he acted as consulting engineer on several important building projects, at the same time continuing his activities in the printing field.

In 1904 he opened his own office as consulting engineer for the design and construction of power plants, heating and ventilating systems and other mechanical equipment. From 1911-1915, he was consulting engineer for Harvard University.

During this period Mr. Timmis conceived the idea of combining the architectural with the engineering work of his office. He established the firm of Timmis & Chapman, architects and engineers, specializing in the design and supervision of erection of manufacturing buildings and equipment.

During the war, he was actively engaged in a number of war projects, such as the committee co-operating with the U. S. Navy on submarine development. He was also consultant on the heating system for Camp Upton and was manager of the Powder Apparatus Department of the Government Smokeless Powder Plant at Nitro, West Va.

After the dissolution of his partnership in 1924, Mr. Timmis continued his work as architect and engineer. Among the important buildings he designed are: The Travelers Insurance Building, Hartford, Conn., and the plant of Edward Langer Printing Co., Jamaica, N. Y. He was retained by many firms, particularly in the heating industry, to make surveys of their business and was frequently called upon to arbitrate disputes arising in this and kindred fields.

Mr. Timmis became active in the American Society of Heating and Ventilating Engineers in 1911 and served successfully as a member of the council and as first vice-president. He was also a member of the A.S.M.E. and vice-chairman of the New York Building Congress Standards Committee.

He is survived by a widow, one son and two daughters. His son, William W. Timmis of the M. E. Conran Company, Inc., of Brooklyn, will continue his father's business as consulting engineer.

Mr. Timmis was a member of the Engineers' Club and of the Jamaica Country Club.

Dean W. F. M. Goss

After devoting nearly 40 years to the teaching of engineering subjects, and to executive leadership in two of the most important technical schools of America, Dean W. F. M. Goss died in New York City, March 24, at the age of 68. Doctor Goss was the founder of engineering at Purdue University where, in 1879, he initiated the course in mechanical arts under the provision of the Morrill act, in the basement of the old pharmacy building. He later was made dean of engineering, which position he held until 1907, when he went to the University of Illinois as dean of the college of engineering. Ten years later he resigned to become president of the American Railway Car Manufacturers' Association, which connection he maintained until 1925, when he retired to his boyhood home in Barnstable, Mass.

Familiarly known as "Papa" Goss, the dean was a source of inspiration to thousands of men who today are prominent in various branches of engineering. Railroad presidents, engineering executives, consulting engineers—men in every phase of technical activities—drew from him inspiration to tackle engineering problems that had not been solved.

Early in the nineties, Dean Goss, who was especially interested in railway engineering, devised the plan of mounting full-sized locomotives on rollers to which brakes could be applied, so that they could be tested under actual running conditions. This was the first locomotive laboratory of its kind in the world and from it has come a great deal of information of inestimable value to the railway world. So outstanding were the results obtained through the use of this locomotive laboratory, that the greater part of all research work of this character has been carried out at Purdue for the last 30 years, and, as a consequence, Dean Goss, for nearly that period, had been acknowledged international authority on railroad mechanical matters. Dean Goss was a voluminous writer, both of technical articles and of books, and these have enjoyed a world-wide reception because in them always was found a happy blending of academic and practical viewpoints and consideration.

W. P. Powers

In the passing of W. P. Powers, March 28, at Los Angeles, Calif., The Powers Regulator Co., Chicago, has lost its president, and the heating industry at large mourns the loss of one of its grand old men.

Mr. Powers was born at Whitewater, Wis., in 1842, the son of D. J. Powers, formerly president of the Union Bed

W. P. Powers

and Springs Co., Chicago. William Powers received his early education in the schools of Palmyra, Wis., and in LaCrosse, and then went to the University of Wisconsin, from which he graduated in 1860. At the time of his death he was the oldest living alumnus of the university. He came to Chicago from LaCrosse, Wis., in 1890, and in that year organized The Powers Regulator Company for the manufacture and sale of apparatus for the automatic control of temperature, in which field he was a prolific and successful inventor. Mr. Powers was a veteran of the Civil War, a member of the Grand Army of the Republic, and of the Loyal Legion. He had, for many years, made his home in Los Angeles.

Mr. Powers is survived by three sons, Fred W. Powers and Robert A. Powers, who have headquarters at the factory in Chicago, and Donald J. Powers, who has charge of eastern business with headquarters in New York. There also is a daughter, Mrs. Mary Powers Marshall, who has lived for many years in Switzerland.

Mr. Powers was greatly loved by his associates and employees because of his delightful personality and constant appreciation of the rights and opinions of others.

Funeral services were held in Los Angeles, Calif.

ALBERT E. FORD, president of Ford & Kendig Co., 1428 Callowhill St., Philadelphia, Pa., died of pneumonia at his home in that city, March 22, at the age of 80. Mr. Ford founded the Ford & Kendig Company in 1871, and during his career trained many men in the heating and plumbing industry. He was one of the organizers of the National Pipe and Supplies Association and held the office of president, from its inception, for many years.

C. S. WINSTON, president of the Cornell Utilities Co., New York and Philadelphia, distributor of Nokol burners, died of pneumonia, March 20.

A. L. BROOMALL, manager of the renewal-parts engineering department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., died of pneumonia at his home in Wilkinsburg, April 10, at the age of44. Mr. Broomall graduated from Lehigh University with the degree of B. S. in E. E. Immediately after graduation he entered the Westinghouse company and continued there until his death.

J. J. BENNETT, manager of the Boston branch of the Richmond Radiator Company, died at his home in Worcester, Mass., April 2.

WILLIAM ROBERT QUINN, Pacific Coast representative of the Combustion Engineering Corp., of New York, died at the Hotel Manger in New York, April 12, while on a business trip to the east. Mr. Quinn was well-known as a designer of fuel-oil burning equipment, and was president of the Quinn Oil Burner & Torch Company until this company was purchased by Combustion Engineering Corporation in 1922. He then became manager of the fuel-oil-burning equipment department of this organization, which position he held until he went to San Francisco as representative.

Revised Uniform Mechanics' Lien Act

Announcement is made by the Department of Commerce that the committee appointed some time ago by Secretary Herbert Hoover to study the mechanics' lien laws of the various states for the purpose of determining whether the subject is susceptible of uniform legislation has completed the second tentative draft of a uniform act.

Mechanics' lien acts are in force in all states of the union for the purpose of protecting the claims of contractors, subcontractors, materialmen, laborers, and others who contribute to an improvement by constituting the property improved a security for their claims while at the same time protecting the owner from payment of claims which, as to him, would be unjust. Complaints have been made that some existing laws are inequitable and that lack of uniformity causes unnecessary expense and inconvenience to those who do an interstate business and to laborers who move from state to state. At the request of various groups this advisory committee was appointed.

The committee is composed of representatives of the principal groups engaged in the construction industry. The National Conference of Commissioners on Uniform State Laws, which is interested in all questions of uniform state legislation and which is composed of officially appointed delegates from each state also has a committee studying this subject and working in close co-operation with the department committee.

The first tentative draft of a Uniform Mechanics' Lien Act was published in the fall of 1926, and distributed to individuals and organizations known to be interested in the subject, soliciting their suggestions and criticisms. A considerable response resulted from this solicitation and in the light of these suggestions which have been carefully analyzed by the committee, the second tentative draft has been prepared.

The new draft has been printed for distribution and criticism and will be available at ten cents per copy, by addressing Dan H. Wheeler, secretary, Standard State Mechanics' Lien Act Committee, Department of Commerce, Washington, D. C.

STATEMENT OF THE OWNERSHIP, MANAGEMENT CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE HEATING AND VENTILATING MAGAZINE, published monthly at New York, N. Y., for April 1, 1928.

State of New York, County of New York, ss.:

Before me, a notary public in and for the State aforesaid, personally appeared Arthur S. Armagnac, who, having been duly sworn, according to law, deposes and says that he is the editor of The Heating and Ventilating Magazine, and that the following is, to the best of his knowledge and belief, a true statement of said publication for the date shown in the above caption, required by the act of August 24, 1912, embodied in Section 411 Postal Laws and Regulations printed on the reverse of this form to wit:

1. That the names and addresses of the publishers, editor, managing editor, and business managers are:

Publisher, Heating and Ventilating Magazine Co., 386 Fourth Ave., New York, N. Y.

Editor, Arthur S. Armagnac, 386 Fourth Ave., New York, N. Y.

Managing Editor, None.

Business Manager, Gustave Petersen, 386 Fourth Ave., New York, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given).

Heating and Ventilating Magazine Co., 386 Fourth Ave., New York, N. Y.

Arthur S. Armagnac, 386 Fourth Ave., New York, N. Y.

Gustave Petersen, 386 Fourth Ave., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more or total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain, not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustee, hold stock and securities in a capacity other than of a bonafide owner and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

ARTHUR S. ARMAGNAC, Editor.

Sworn to and subscribed before me this 31st day of March, 1928.

CHRISTOFORO PIEDERILLANO,
Notary Public.
(Commission expires March 30, 1929.)
New York County Clerk's No. 91.
New York Co. Register's No. 9012.

New Apparatus and Appliances

Clarage-McCann-Harrison Industrial Heaters

A HIGHLY specialized equipment, designed for the transmission of heat, direct from the products of combustion, to the air passing through the heater, has been placed upon the market by the Clarage Fan Co., Kalamazoo, Mich. These mechanisms literally are unit heaters direct fired by gas or oil, in which high heat-transfer is accomplished by means of exceptionally efficient heating surfaces.

Hot combustion gases pass up and around the heater tubes under negative pressure, due to the suction of a fan; the cold air to be heated passes horizontally through the heater tubes under pressure furnished by a supply fan. Cold air makes two passes through the heater tubes, moving from top to bottom, providing an average maximum differential between the temperatures of the products of combustion and air. The section in which the heat transfer occurs consists of many interlocked special-shaped tubes of pressed ingot iron, vitreous coated. These tubes are accurately proportioned for cross-section area and exposed heating surface, so that maximum required air delivery temperatures are obtained with combustion gases at temperatures not exceeding 900° F. This maximum temperature is designed to provide long life for the heating element. All parts of the heating surface are readily accessible by removing the vent-hood at the top of the heater.

The combustion chamber is built up with special shaped refractory tile in a heavy steel frame; an exceptionally large mass of refractory is used to create ideal conditions for high-efficiency combustion. The flame from the burner is completely surrounded by tile. Air, entering through openings in the bottom of the chamber and through the burner plate, is heated by intermingling with the products of combustion, by radiation and by contact with the hot tile walls. Products of combustion and the heated air are mixed and distributed to the heating surface through a tile arch. Design of the combustion chamber is such that, when running at the rated capacity, the temperature of the heated gases, entering the gas passages of the heating surfaces, is not more than the maximum for which they are designed.

OIL BURNERS

The burners are of the atomizing type, using compressed air at 5 lbs. to 20 lbs. pressure; the compressed air is discharged through an orifice over the oil nozzle, which connects through the burner body to the oil reservoir. A constant level is maintained in this reservoir, several inches below the tip of the oil nozzle, by means of overflow; when the oil supply is shut off, the oil in the reservoir drains back to the control unit or storage tank. This oil is under atmospheric pressure only. Air, passing over the oil nozzle, produces a vacuum which raises the oil to the tip of the nozzle, where it meets the jet of compressed air and is sprayed into the combustion chamber in the form of a fine mist.

Two converging burners are used in each heater unit, set at an angle with the floor. As the smallest orifice from the reservoir to the tip of the burner is ⅛-in. in diameter, and there are no needle valves in the oil system, trouble from clogging is obviated.

The amount of oil syphoned through the oil nozzle is directly proportional to the amount of air projected over the oil tip; this makes it possible to vary the capacity of the burners by changing the air pressure. Any number of burner units can be placed in a battery and adjusted so that they will burn the same quantity of oil at a given air pressure. The total battery may then be controlled through control-valves in the air line operated from a thermostat. Either hand or automatic temperature control is available.

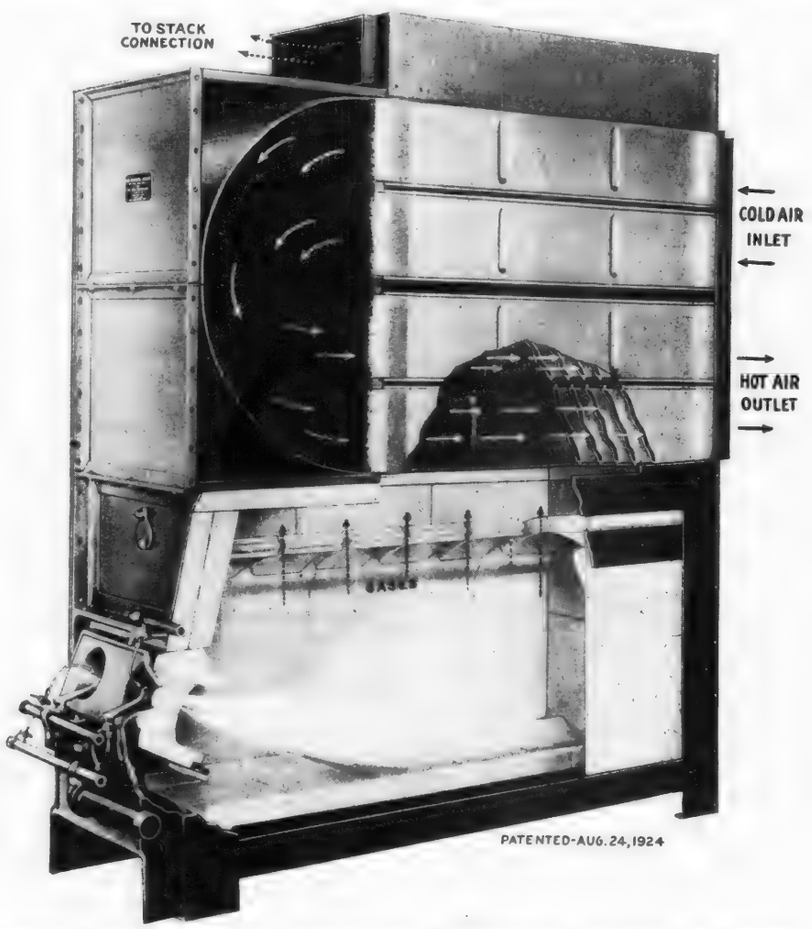
Compressed air for the burners is furnished from a factory supply, already installed, or by an independent motor-driven compressor installed with the unit.

OIL-CONTROL UNITS

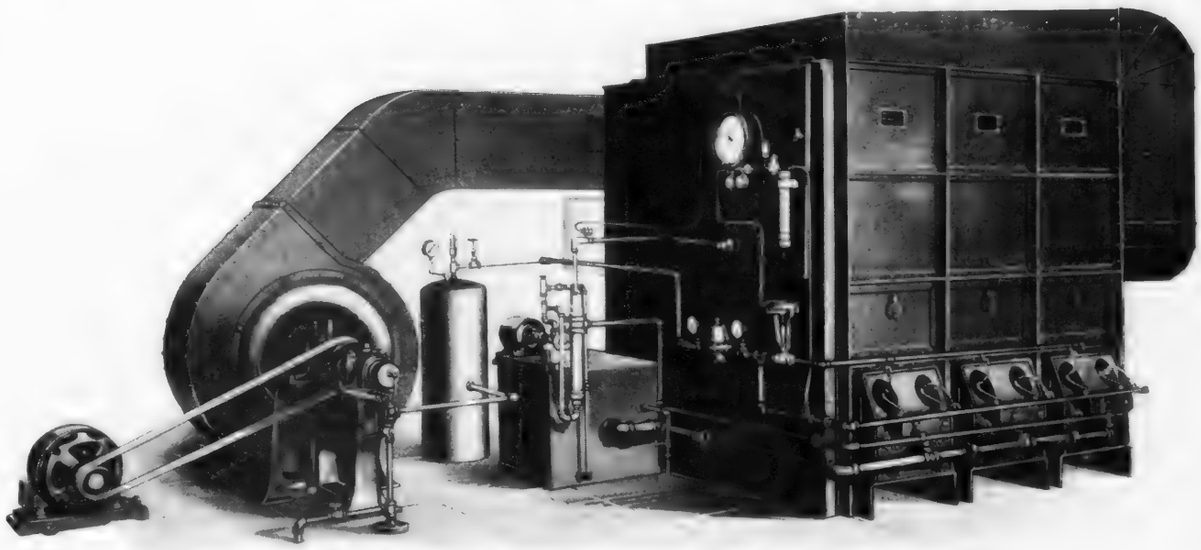
An oil-control unit is installed with the heater. This consists of a welded steel tank, with a float valve for controlling the amount of oil entering the system from the storage tank, a safety shut-off valve which operates only in case of failure of the float valve, and a motor-driven oil pump for maintaining a constant circulation of oil through the reservoirs on the front of the heaters. A bucket-type safety shut-off valve is used.

An electric immersion oil heater is furnished in case viscous oil is to be burned.

Two Clarage fans are furnished with each heater; one is the supply fan which delivers the cold air to the heater and forces the warm air through the system of ducts to all parts of the building;



Heater Cutaway to Show Arrangement of Combustion Chamber and Heater Tubes and Movement of Air



Complete Set-Up of Clarage-McCann-Harrison Gas or Oil-Fired Industrial Heater

the other is the burner fan which furnishes the necessary draft and re-circulates the products of combustion through the heating element.

CAPACITIES

Clarage-McCann-Harrison heaters are furnished in units each having a capacity of 600,000 B.T.U. per hour, with a maximum air delivery temperature of 200° F. They can be assembled in batteries as desired.

These units provide a high degree of flexibility; they deliver heat immediately upon lighting the burner and can be operated over a wide range of outdoor temperatures to maintain a fixed inside temperature. The system can be used for ventilation, as well as for heating. During the summer months air can be taken from out-of-doors and distributed by the fan throughout the plant; in cold weather, when the heaters are operating, part of the air can be drawn in from outside and part recirculated as desired. Air washers can be used in conjunction with the heater if clean air is essential and humidification desirable.

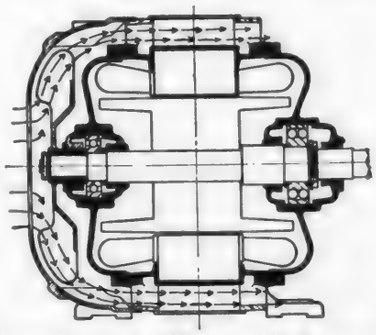
The equipment has been approved by the National Board of Fire Underwriters as standard, and insurance rates are not increased by their installation.

Wagner Air-Jacketed Motors

An air-jacketed motor, for serving where dust, fumes and moisture are present in sufficient quantities to necessitate protection to motor and property, has been developed by the Wagner Electric Corp., St. Louis. The entire motor is surrounded by a jacket open at both ends, with fan blades on a shaft extension between the sealed motor and its outer jacket. The only clearance between rotating and stationary parts of the motor is in the bearing housing, and here no gases or solid particles can get past the grease packing.

The stator is the only part of the standard single-phase repulsion-induction and polyphase squirrel-cage motors subject to change in design. The exposed outer rim is deeply grooved to increase radiation surface. The stator laminae are welded together to lessen vibration and to reduce magnetic noises.

Ball bearings are used in a double



Cross-Section of Wagner Air-Jacketed Motor

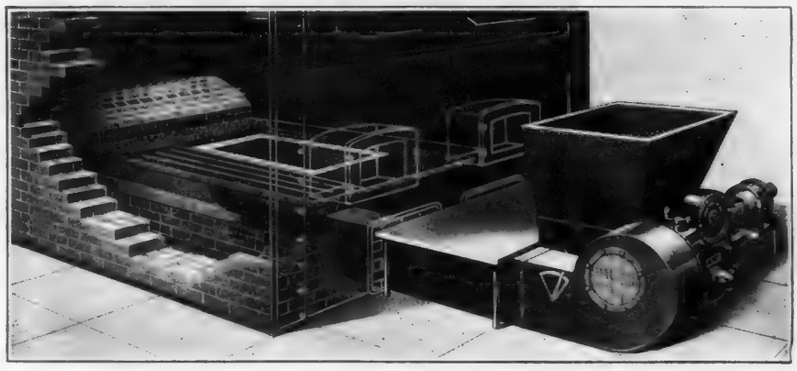
row, self-aligning in one end-plate and deep groove in the other to take the end thrust. The shafts are made slightly longer than those for standard motors, to permit fan mounting. Single-phase repulsion-induction motors may be had in sizes from 1 to 20 H.P., and polyphase squirrel-cage motors in sizes from 2 to 30 H.P. These motors are designed for a temperature rise not to exceed 50° C., and meet all A.I.E.E. and N.E.L.A. standards.

Combustioneer—An Automatic Coal Burner

A new device for automatically firing coal has been placed upon the market by Combustioneer, Incorporated, 570 West Randolph Street, Chicago. This machine is designed to feed coal by the underfeed principle in such a way as to prevent air holes in the fire and to eliminate the formation of clinkers. Combustioneer is available in several sizes for boilers rated up to 200 H.P. The feature of this device is the adjustable air control which can be varied to conform to variations in the quality of coal, changes in the load or in the weather conditions.

A unique drive is practically noiseless in operation, the first reduction being a bronze worm-gear, and the final drive is through an all-steel overrunning clutch, operated through a bronze connecting rod and oversized eccentric.

This new coal-burning device is the result of several years of experience, considerable experimentation and testing by a group of engineers. R. C. Goddard, the president of the Corporation, formerly was president and general manager of the Iron Fireman Corporation. The sales will be handled by W. S. Burke, formerly sales manager of the Iron Fireman Corporation.



Combustioneer With Underfeed Firing Is Adapted to Low-Cost Coal

Controlled Zone Heating

Zoning of building heating-systems is recognized as desirable for economy and for the comfort of occupants. Zoning consists of sectionalizing the system to supply specific heating demands within commercial limits. It makes possible using the radiation on different sides and parts of the building at proper capacity depending on sunshine, wind, temperature or other weather conditions. Zoning also is desirable where the lower floors of buildings are occupied by stores with different working hours than the offices.

The great drawback experienced in zoning is suitable control. This need has brought about the development of the Tallmadge electrical remote control, manufactured by Webster Tallmadge & Co., Inc., 50 Church St., New York.

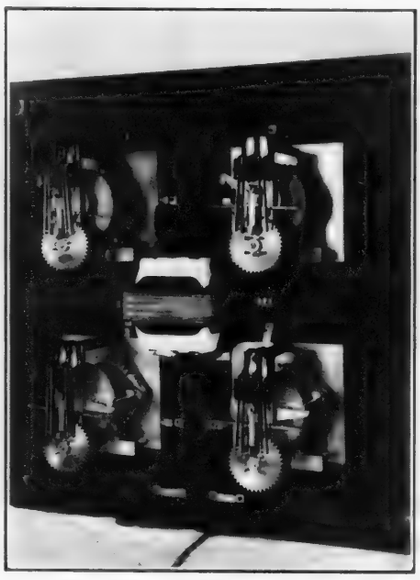
A central station, located conveniently for manipulation by the superintendent, engineer or other operator comprises a panel board with simple weather-indicating instruments and the transmitter buttons for setting the control valve for each zone.

The transmitter consists of a double-acting fire-alarm type telegraph transmitter that sends low-voltage electrical impulses to a receiving relay in the valve mechanism. The dial of the transmitter, graduated in per cent, with its pointer shaped button is mounted on the front of the panel and the mechanism is neatly mounted in a unit on the panel back.

Compactness, simplicity, and ruggedness characterize the valve mechanism. This consists of a standard-make high-speed universal 35-watt motor geared down through a reduction of 27,000 to 1 to the valve stem. The valve is prevented from jamming on its seat by a spring-loaded clutch. Positively-driven quick-break limit switches prevent the motor from moving the valve beyond its range of operation. The clutch is so arranged as to be readily adaptable to drive any size or type of valve necessary for the operation of the system, and frequently the existing valves on old systems can be used.

The motor contacts are set by an ingenious combination of reversible selector relay and very sensitive pressure element or diaphragm.

The whole valve mechanism weighs approximately 22 lbs. and is supported by two rugged clamps around the pipe, with stout struts to ears on the duraluminum case enclosing the gears and relay.



Rear View of Control Board

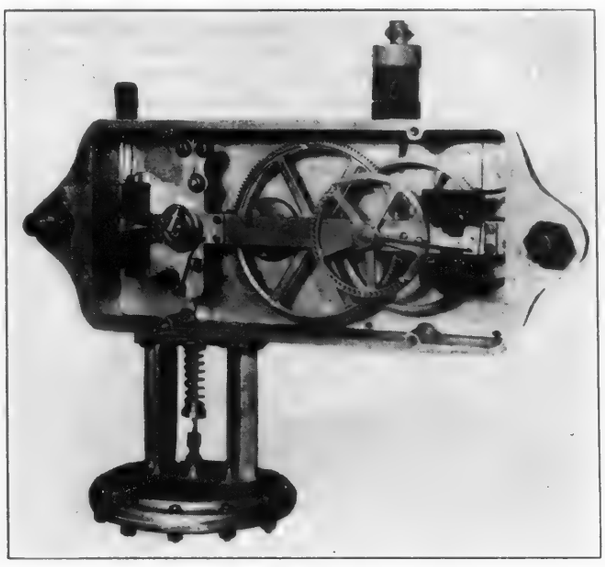
Heating systems must be designed for the most severe weather conditions and this, in the vicinity of New York means zero degree weather, a fifteen mile wind and 70° F. inside temperature. As the average outdoor temperature for this same region is 40° F., the average heat required for 70° F. inside temperature is less than half that required for the most severe weather conditions. With an uncontrolled system the condition of 100% capacity on the system prevails throughout the heating period so the amount of saving possible by proper control and zoning can be appreciated.

Thermostatic Metal

A unique combination of metallurgical and mechanical processes has been developed to produce a thermostatic metal with definite and outstanding characteristics. In the process, two blocks of different alloys are welded together through a secret process and the mass is then rolled to any desired thickness, from 1-in. to as thin as 0.003-in., in any case the resulting metal consisting of laminations of equal thickness of the two alloys. This laminated material is cut into strips or other desired forms for use in thermostatic instruments, where changes in heat are to be converted into mechanical movement. This process has been developed by the W. M. Chace Valve Co., Detroit, Mich. By carefully choosing the alloys and having them made to rigid specifications, it is possible to produce thermostatic elements that will have any desired characteristics of warpage and a definite return always to the starting point. One class of this metal composed of nickel steel and patented alloys has an expansion curve up to 1500° F. and can be heated as high as 1500° F. without losing its elasticity. The company also has developed a method of treating these thermostatic elements so that they will not be subject to corrosion. This metal is being used successfully in various forms and shapes—spiral coils, helical coils, flat pieces, "U" bends, "S" shapes and many other forms.

New Type Chalmers Oil Burner

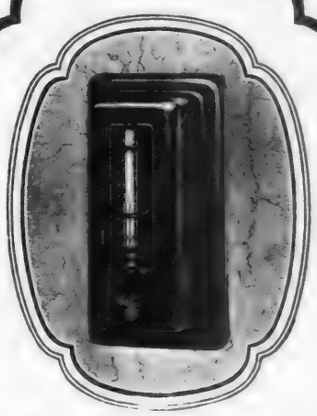
A new "gun-type" burner is announced by the Chalmers Oil Burner Co., 1234 Central Ave., Minneapolis, Minn. This burner is designed for installation in all types of heating plants and to burn 28° A.P.I. oil or lighter. Electric ignition is used. Accompanying the announcement is a list of a large number of users of Chalmers oil burners, many of which have been in operation since 1920.



(Above) Valve Control in Position on Steam Main

(At Left) Valve Control With Cover Removed, Showing 27,000:1 Gear Train by Which 35-Watt Motor Is Enabled to Open and Close Large Steam Valve

MASSACHUSETTS MUTUAL LIFE INSURANCE CO.
SPRINGFIELD, MASS.
KIRKHAM & PARLETT, *Architects*, Springfield, Mass.
R. D. KIMBALL CO., *Engineers*, Boston, Mass.
WYCKOFF & LLOYD COMPANY,
Heating Contractors, Springfield, Mass.



The Powers Type D Thermostat

Does not need to be adjusted or overhauled annually. Often gives 15 to 20 years of accurate control without repairs of any kind. Gives true GRADUATED control. Uses only 10% of compressed air required by other thermostats. Costs more. It's worth more!

"The Best Costs Less in the End"

One of the show places of Springfield, Mass., is the large new building shown above. Upon entering it, one is impressed by its symmetry, excellence of design, solidity, and its rugged appearance of durability. Here is a building which will LAST.

Inside, the quality of the mechanical equipment is in keeping with the building itself. In selecting Powers Regulation to control the temperature in this building, the Architect and Engineer have provided their client with a system that gives 15 to 30 years of ACCURATE and DEPENDABLE control without the annual adjustments, repairs, and "SERVICE" bills which so often come with lower *first cost* systems of regulation.

THE POWERS REGULATOR COMPANY
35 Years of Specialization in Temperature Control
2718 Greenview Avenue, Chicago, Ill. Offices in 37 Cities

(4112)

POWERS

New Trade Publications

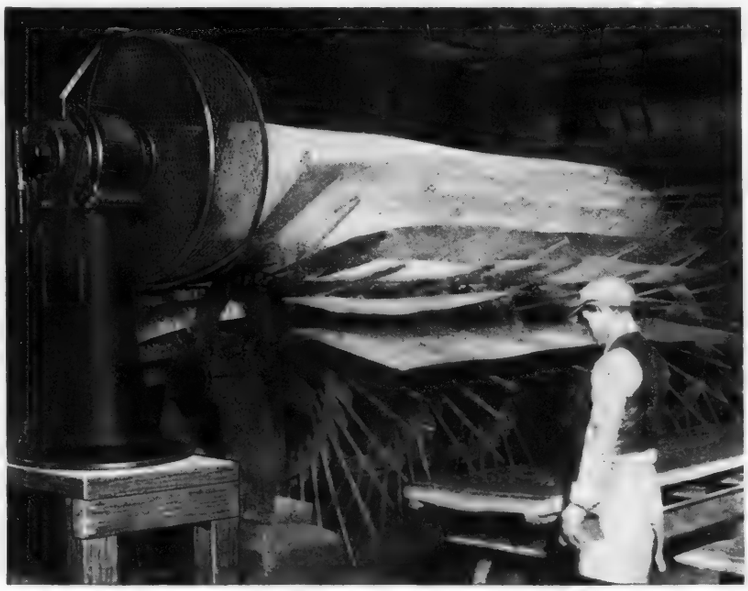
MAINTAINING TEMPERATURE AND HUMIDITY CONTROL IN A PRINTING PLANT is the subject of a circular issued by Johnson Service Co., Milwaukee, Wis. In the bulletin, the president of this printing company reports: "We are getting much better register and are having no trouble at all with static electricity." Before installing the Johnson system of control, this printing company because of static troubles had to keep the temperature above 80° all the time to be able to operate its two-color presses. Now the press-room temperature is kept at 72° and the humidity at about 50% all the time—without any attention at all.

THE WEATHER VEIN initiates its eighth year with an interesting issue devoted to the advantages of manufactured weather in theatres; especially is featured the results of air-conditioning in Loew's State Theater, Cleveland, as well as a number of other important theaters where Carrier equipment has been installed.

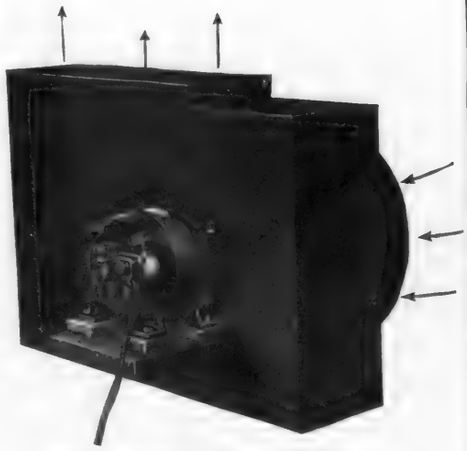
PERKINS MAN COOLER is the title of a catalog issued by B. F. Perkins & Son, Inc., Holyoke, Mass., featuring a line of blast fans, ranging from 24 in. to 34 in. diameter, and designed to furnish air blasts for various applications in industry where operators work under conditions of high temperature or handle hot materials. These units consist of direct-driven fans mounted on pedestals in such a manner that they can readily be transported from place to place. Their applications are almost unlimited, for example, in a sheet mill, where the blast is directed to sheets undergoing galvanization, greatly accelerating the cooling of the metal; in drop forge plants, bar mills and similar locations where men are obliged to work around and handle masses of hot metal. An interesting installation is pictured in a two-page view showing 100 24 in. Man Coolers in the largest puddle mill in the world. These units have been highly developed with pro screens around the fan. They require from 1 to 5 H.P. motors and weigh from 700 to 1200 lbs.

YEARS AHEAD is the caption of a circular issued by Sterling Electric Motors, Inc., Los Angeles, Cal. This bulletin emphasizes the features of the Sterling enclosed motor which can be used totally enclosed, pipe ventilated or totally enclosed ventilated. The rotors are cast by a special process, carefully balanced, and guaranteed for the life of the motor. Either ball or roller-bearing can be had. The entire machine is enclosed so that it can be used under the most severe atmospheric conditions.

Completely-Enclosed Sterling Electric Motor



36-In. Perkins Man Cooler Operating in Sheet Mill Cooling Galvanized Sheets



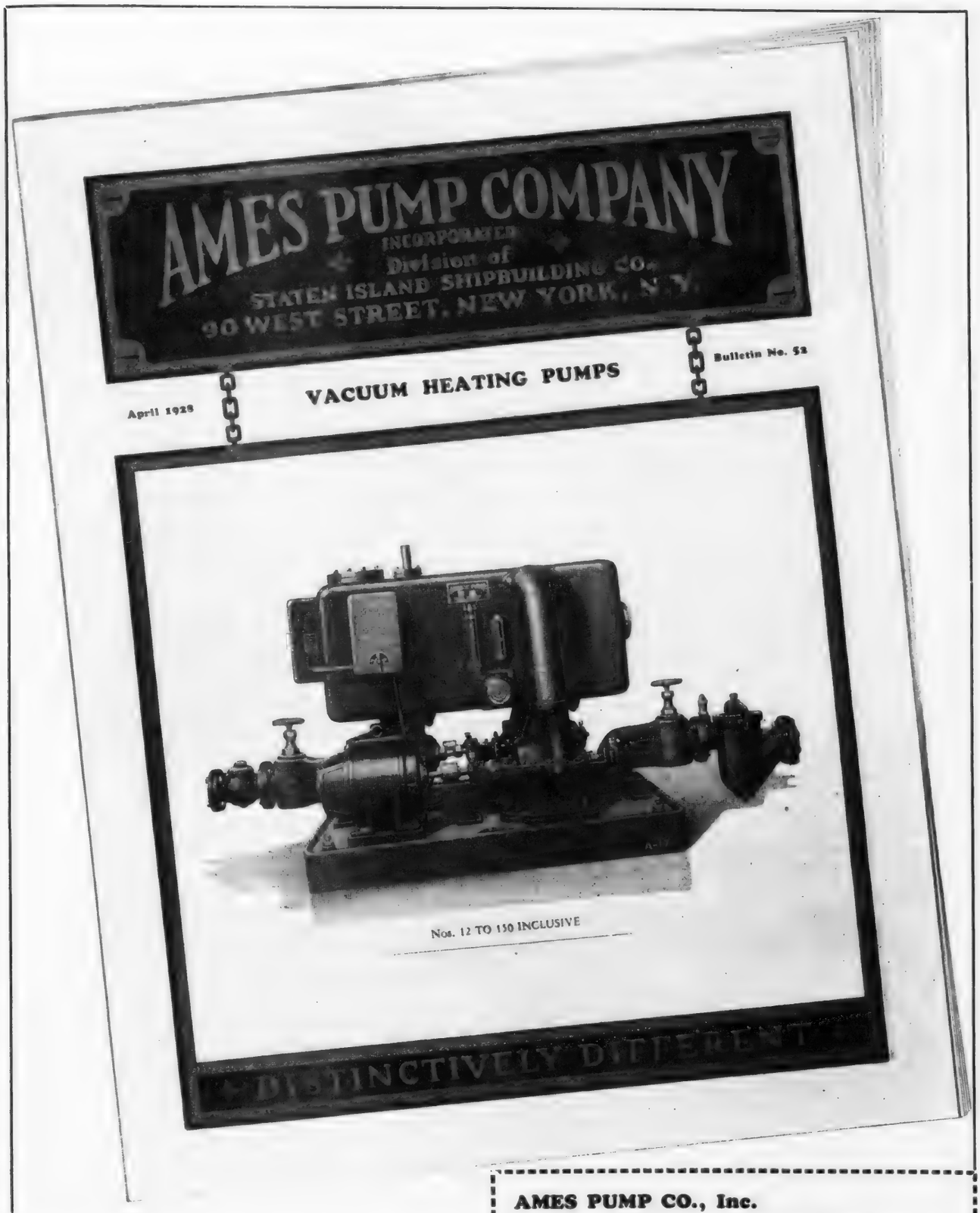
"Heat Hustler" Warm-Air Furnace Booster

AFCO VENTILATING SPECIALTIES are featured in a catalog being circulated by the American Foundry and Furnace Co., Bloomington, Ill. These specialties consist of wire radiator grilles, wire register grilles, aluminum back-pressure dampers, grilles with louvres, air diffusers and specialties for warm-air installations. A line of roof ventilators also is illustrated and described.

An interesting specialty is the "Heat Hustler," which consists of a small motor-driven blower mounted on a housing which forms the warm-air boot to a furnace. The operation of the blower is controlled by means of a switch located in the room to be heated, or from a thermostat. The "Hustler" draws warm air through the main pipe and forces it up through the warm-air register. Size 8½ in. by 11 in. Pp. 24.

RICHMOND TUBE RADIATORS are described in catalog No. 503 issued by the Richmond Radiator Co., Inc., 1480 Broadway, New York. On the title page it is stated that the ratings of Richmond radiators are determined by condensation tests according to the code of the A.H.S. & V.E. for testing direct radiators and that certification of efficiencies and ratings are prepared by the Frost Research Laboratory. Following an argument for radiator ratings, based on actual tests, tabular data give the catalog ratings and equivalent radiation for 3, 5 and 7-tube radiators of various types. Dimensional and tapping data also are given. The catalog as a whole is an interesting example of a manufacturer furnishing actual performance data in great detail. Size 3½ in. x 6½ in. Pp. 32.

DRIVE OLD MAN BAD AIR OUT WITH A FRESHAIRE is the caption of a small circular distributed by Freshaire Division, Paul & Beekman Mfg. Co., Philadelphia, Pa. Freshaire is a small exhaust fan designed for removing air from kitchens or other rooms, and may be had in styles to be inserted above a window or for permanent installation in a wall. The opening is shielded by a circular plate which automatically moves outward when the motor is started, creating an annular space through which the exhaust air passes.



Mail this Coupon TODAY

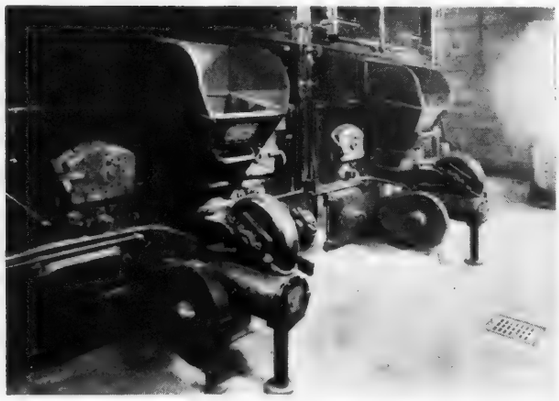
AMES PUMP CO., Inc.
Division of STATEN ISLAND SHIPBUILDING CO.
90 West Street, New York, N. Y.

Please send your Bulletin 52-C 5

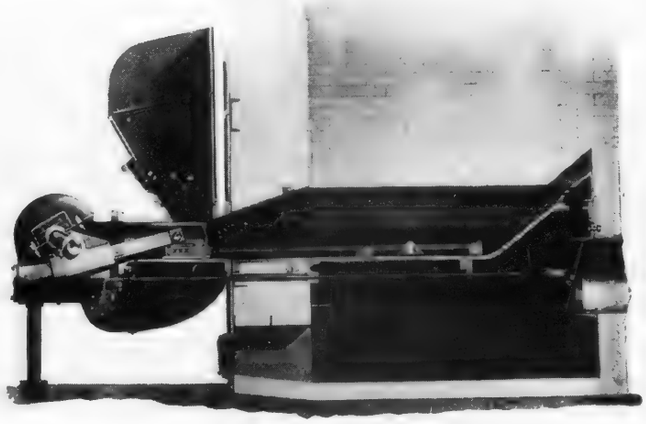
Name .....

Street Address .....

City..... State.....



A UniStoker Installation



(At right) Scheme of Operation of a Detroit UniStoker

THE DETROIT UNISTOKER is described in a bulletin issued by the Detroit Stoker Company, Detroit, Mich. This stoker embodies principles of design and construction which have been developed by the Detroit Stoker Company, and is a single retort, mechanically-operated, side-cleaning type. Ashes and refuse are dumped and removed at the front. Little or no excavation or concrete work ordinarily is required and the installation is extremely simple. The stoker is self-contained with motor and fan integrally-mounted with the driving mechanism, making the stoker particularly adapted to installations with small and medium-sized boilers. Each stoker constitutes a complete independent unit, making it, when installed with one of a battery of boilers, a complete plant. Automatic regulating equipment can be had for varying the supply of fuel and air. The operating mechanism of a UniStoker consists of an electric motor direct-connected to the gear case, which comprises a combination of two sets of machined worms-and-gears, with worms cut from steel drop-forgings and Timken anti-friction tapered roller bearings throughout. All worms and gears run in oil, protected from dirt and dust by a completely-enclosed gear case. The forced-draft fan is located at the front of the stoker and the air duct is so designed that air is distributed equally to all parts of the fuel bed. Air under control also is admitted through the grate bar sections of the dumps, preventing loss of combustible in the ash. Fuel is delivered below the fire uniformly throughout the entire length of the retort, providing the maximum underfeed action. The UniStoker is designed to handle the cheaper grades and sizes of fuels.

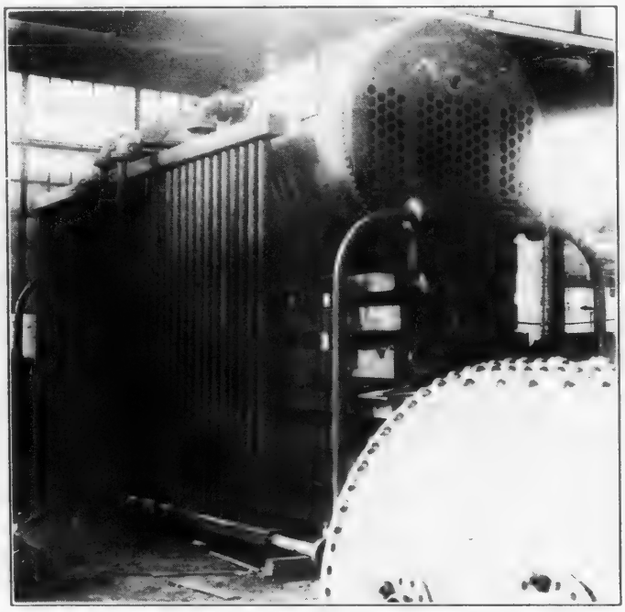
VENTILATION NEWS is a publication issued, from time to time, in the interests of better ventilation by the American Blower Corp., Detroit. It appears in the form of a roto-gravure newspaper section and is filled largely with excellent photographs contrasting outdoor views, where fresh air is to be had for the breathing, and indoor views where it is necessary to install artificial means for securing the desired conditions.

TEEPLE TEMPERATURE CONTROLS are featured in a catalog issued by L. R. Teeple Co., Portland, Ore. These controls consist of plain and clock room-thermostats, a pressure regulator, hot-water regulator

Teeple Temperature Controls

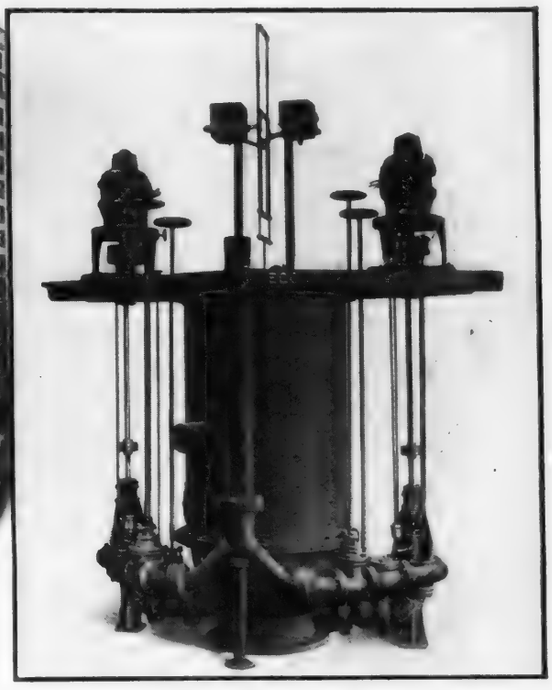
and a warm-air furnace regulator, a relay switch for oil burners and similar adaptation, an electric gas-valve and a service-water tank regulator. The catalog contains diagrams showing the connections to be made in each instance.

THE NUWAY BOILER is featured in a bulletin issued by the Nuway Boiler and Engineering Co., 53 West Jackson Boul., Chicago. This is a steel fire-tube boiler, with vertical water-tubes lining the sides of the combustion chamber, these water-walls being backed with T-shaped tile, high-grade heat resisting material, and a steel casing. These water-walls are constructed of forged steel headers with 4 in. vertical seamless tubes set on 7 in. centers, with handhole plates at top and bottom. It is stated that an unusually rapid and positive circulation is secured through the design of the Nuway Boiler, that it will operate with efficiencies of approximately 75% at loads 200% in excess of the rated capacity. Boilers are built in several sizes between the limits of 45 and 311 rated horse-power and are guaranteed to develop high capacities per unit of space occupied. Reports of a test made by the Commercial Testing & Engineering Company are quoted in detail.



Steel Fire-Tube Boiler With Vertical Water Tubes Surrounding Combustion Chamber—the Nuway

CLIFT HOTEL, SAN FRANCISCO
Plumbing Sub-Contractor
Lawson & Drucker, 465 Tehama St., San Francisco
Architect



Safeguarding the Vital Parts of a Building

MOST vital to a building's welfare is the rapid, automatic removal of sewage and seepage. If sewage pumps fail, health, heat, light and water supply are placed in jeopardy.

The ability of Economy Sewage Ejector Pumps to keep going under emergency flood conditions meets the severe requirements of the Clift Hotel, San Francisco. The reputation of such an institution is too valuable to be ever risked by unpleasant conditions of plumbing. Economy's record for dependability, in this as in other fields, is reassuring to the men whose capital is invested.

Whatever your pumping problem, whether sewage ejection, heating, water power, or any other condition where constant, adequate pressure is demanded, Economy will handle the job satisfactorily. Send for Bulletin describing the type that fills your needs.

Economy Pumping Machinery Company
3431 West 48th Place, Chicago
Representatives in Principal Cities—Telephone & address under Economy Pumping Machinery Co.

Economy Pumps

TABLE OF CAPACITIES OF STANDARD JENNINGS HEATING PUMPS

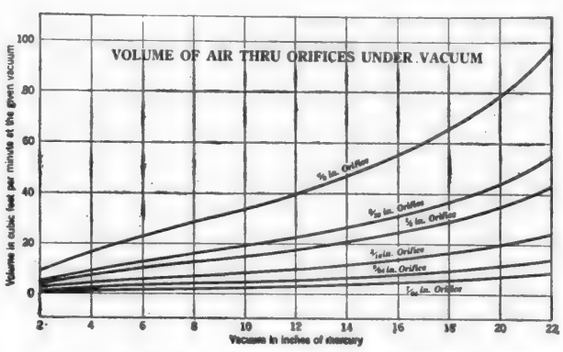
Size	Equivalent Direct Radiation sq. ft.	Diameter Standard Orifice Used for 10 inch Vacuum inches	Air Capacity cu. ft. per min.	Water Capacity At 180° F Against 10 lbs. Pressure gal. per min.	Actual Motor H. P. for Delivering Water Against 10 lbs. Pressure	R. P. M. And Motor H. P. 10 lbs.		20 lbs.	
						R.P.M.	H. P.	R.P.M.	H.P.
T	2,500	7-64	3	4	.33	3450	⅓	3450	½
M	5,000	7-64	3	8	.75	1800	¾	1800	1
A	8,000	9-64	5	11	.9	1800	1	1800	1½
B	16,000	3-16	9	22	1.4	1800	1½	1800	2
C	26,000	1-4	15	35	2.0	1800	2	1800	3
D	40,000	9-32	19	60	2.8	1200	3	1800	5
E	65,000	3-8	34	90	3.9	1200	5	1800	7½
F	100,000	1-2	52	140	7.0	1800	7½	1800	10
G	150,000	9-16	90	200	9.8	1150	10	1150	15
H	300,000	Two 9-16	180	400	14.0	850	15	1720	20

Air capacity guaranteed

AIR capacity of the Jennings Vacuum Heating Pump is defined as the volume of air, measured in cu. ft. per min. at the operating vacuum, which the pump will withdraw from the atmosphere through an orifice of given dimensions while the pump maintains the specified vacuum at the pump suction and while it is handling its rated capacity of water in g.p.m.

The orifice used is a thin plate, ⅛ in. thick with sharp edges, having a reamed hole of specified diameter. The table above gives the orifice diameters employed with Jennings Pumps of different rating. The chart below shows the volume of air flowing through orifices of various sizes at the vacuums met in practice.

This method of measurement simulates actual working conditions and so determines *working* air capacity. It also affords a convenient means of obtaining accurately the comparative capacities of two or more pumps. Within limits of plus or minus 2 per cent, air volumes so found will agree with the quantitative measurements of General Electric flow meters, Builders Iron Foundry venturi meters.



Volume of air in cu. ft. per min. (at the vacuum referred to) flowing through orifices of specified size at different pressures.

NASH ENGINEERING COMPANY

81 Wilson Road SO. NORWALK, CONN.

Jennings Pumps

Trade and Miscellaneous Notes

Coming Events

May 3-10, 1928. Thirty-second annual meeting of the National Fire Protection Association in Atlantic City, N. J. Headquarters at Hotel Chalfonte-Haddon Hall.

May 14-17, 1928. Spring meeting of the American Society of Mechanical Engineers in Pittsburgh, Pa. Headquarters at William Penn Hotel.

May 21-23, 1928. Nineteenth annual convention of National Pipe and Supplies Association in Detroit, Mich. Headquarters at Hotel Statler.

June 4-7, 1928. Thirty-ninth annual convention of the Heating and Piping Contractors National Association in Philadelphia, Pa. Headquarters at the Bellevue-Stratford Hotel.

June 12-15, 1928. Annual convention of the National District Heating Association at Atlantic City, N. J. Headquarters at Ambassador Hotel.

June 19-21, 1928. Forty-sixth annual convention of the National Association of Master Plumbers in Memphis, Tenn. Headquarters at the Peabody Hotel.

June 26-29, 1928. Semi-annual meeting of the American Society of Heating and Ventilating Engineers at West Baden, Ind. Headquarters at West Baden Springs Hotel.

August 20-September 3, 1928. Regional meeting of the American Society of Mechanical Engineers at the Twin Cities, and a tour of the Great Lakes.

September 17-20, 1928. Second national meeting of the Fuels Division of the American Society of Mechanical Engineers in Cleveland, O.

October 8-12, 1928. Tenth annual convention of the American Gas Association in Atlantic City, N. J.

October 15-19, 1928. Fifty-seventh annual meeting of the American Public Health Association in Chicago, Ill. Headquarters at the Hotel Stevens.

Miscellaneous Notes

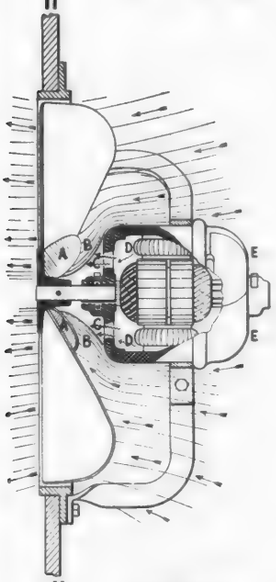
Second International Conference on Bituminous Coal will be held at the Carnegie Institute of Technology, Nov. 19, 1928. Subjects to be discussed will include smokeless fuel, distillation processes, gasoline production from coal and other allied topics.

Ida M. Anderson, who has been connected with the National Federation of Business and Professional Women's Clubs, and with metropolitan newspapers, has been appointed a field representative of the Plumbing and Heating Industries' Bureau, Evansville, Ind. Miss Anderson will further the interests of the industry largely through contact with women's clubs throughout the country.

Division of Simplified Practice, Department of Commerce, announces that a general conference of consumers, technical experts, distributors, and manufacturers, interested in coated abrasive products, was held in Washington, D. C., April 11, to consider drafting a simplified-practice recommendation for this commodity. The Abrasive Paper and Cloth Manufacturers Exchange has submitted a tentative proposal for eliminating superfluous and undesired sizes and varieties of coated abrasive products. It is estimated that the annual output of the industry amounts to more than $16,000,000.

American Public Health Association has opened an office in Chicago, at the Hotel Stevens, in charge of Dr. C. St. Clair Drake. This also is the headquarters of the local committee for the fifty-seventh annual meeting to be held at this hotel October 15-19. The officers of the local committee are Louis E. Schmidt, M.D., chairman, and Arthur E. Gorman, secretary. There will be about thirty general and section sessions at the annual meeting.

AUTOVENT
VENTILATION



There is no substitute for good ventilation. You must either have it or suffer a loss in your production. We have found many manufacturers facing this problem, thoughtless of the hazards of poor ventilation.

For years the Autovent Motor Driven Fan has solved many ventilating problems, and those who are in the ventilating field know the Autovent for its efficiency and adaptability to meet seemingly impossible conditions.

Autovent fans give high efficiency with low power consumption. They are quiet, neat in appearance and easily installed. Eliminate chance of costly breakdown and burnouts. Motor windings after years of service are as clean as when originally installed.

Protected motor prevents air containing grease, acids, moisture, grit or other foreign substances from contaminating motor windings.

Autovent ventilation deserves investigation. Write us for ideas and suggestions—no obligation.

REGISTERED AUTOVENT.

Use Autovent's Cooperation

At our Chicago office there is always a staff of engineers ready to advise you on all ventilation and heating problems. We urge you to make use of our cooperation. It is gladly given without charge.

Autovent service includes the manufacture of Autovent Propeller Fans, "Uniblade" Blowers and Exhausters and Autovent Unit Heaters—a complete, well-built line.

Autovent Fan & Blower Co., 1805-1827 No. Kostner Ave. CHICAGO, ILL.

National Foreign Trade Council, New York, had its fifteenth national foreign trade convention at Houston, Texas, April 25-27. Senor Don Carlos G. Davila, Chilean Ambassador to the United States, addressed the meeting, as did George P. Auld, whose subject was "The Prospect in Europe," E. P. Thomas, president of the United States Steel Products Company, on "The Foreign Trade Outlook," and James P. Butler, on "Foreign Trade Developments in the Gulf States." The convention closed with an address on "Foreign Trade Progress," by James A. Farrell, president of the United States Steel Corporation.

National Fire Protection Association has appointed Victor H. Tousley, for 25 years with the department of gas and electricity of the City of Chicago, and for the past 15 years chief electrical inspector of that department, as electrical field secretary of the association to succeed W. J. Canada, who has accepted a position with the National Electrical Manufacturers Association. Mr. Tousley assumed his new duties May 1, and will have a temporary office at the Underwriters' Laboratories, 207 East Ohio St., Chicago.

Agricultural and Mechanical College of Texas, College Station, Tex., is about to establish a training course for teachers to qualify them to instruct apprentice steam fitters and plumbers. The course will be similar to the one conducted at the University of Illinois and is scheduled for July 10-12. It will be under the direction of Prof. F. E. Giesecke. The plan was proposed at the meeting of the Associated Master Plumbers of Texas, at El Paso, April 16-17, and received the enthusiastic endorsement of that body.

Wrought Iron Research Association has been formed by representatives of leading manufacturers of wrought iron, at a meeting held at the Duquesne Club, Pittsburgh, April 5. The principal object of the association is to gather and disseminate information about wrought iron. Headquarters will be in Pittsburgh.

Carnegie Institute of Technology, Pittsburgh, announces that, excepting a few guest instructors and special lecturers, none but members of the regular faculty staff has been appointed to the summer session staff of the institute.

National Association of Plumbing and Heating Salesmen will hold its third annual convention at the William Penn Hotel, Pittsburgh, May 31-June 2. In addition to the general meetings there has been arranged a number of tours through mills and factories which manufacture products for heating and ventilation. R. J. Maggi, Anchor Sanitary Co., N. S., Pittsburgh, Pa., is chairman of the committee on arrangements.

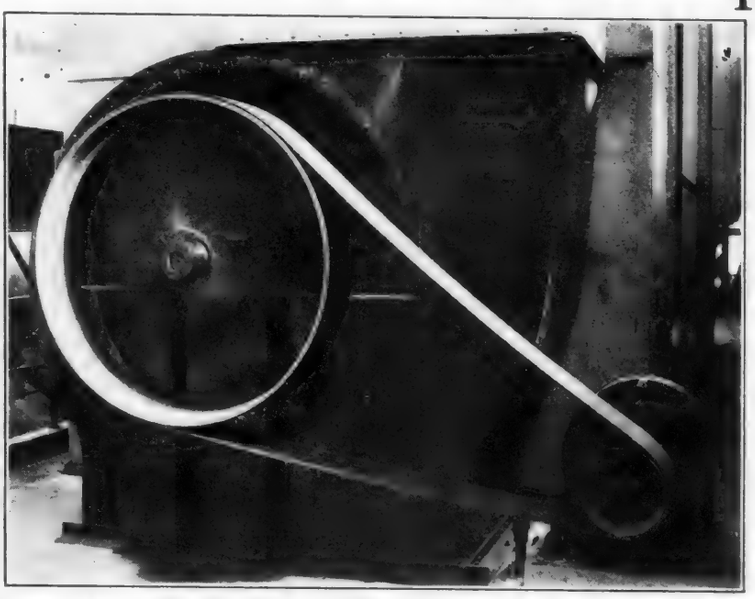
National Pipe and Supplies Association will hold its nineteenth annual convention at the Statler Hotel, Detroit, Mich., May 21-23. Much entertainment has been arranged for in addition to the business sessions of the convention, including a golf tournament, a boat ride on the Detroit River, theater party and dinner dance. Chairman of the various local committees are: General chairman, C. F. Harvey; for golf, William G. Boales and Porter West; program, Fred Kitch; ladies' entertainment, E. Eisenberg; boat ride, Morley Brown; publicity, Howard Harvey, and budget, Lester Lee.

New Quarters for Western Office of Heating and Ventilating Magazine

The Western office of THE HEATING AND VENTILATING MAGAZINE, for some years located at 105 South Dearborn St., has been moved to The Builders Building, Wacker Drive, Chicago. This brings C. W. Presdee, western manager, into closer touch with many of the executives and Chicago representatives of heating and ventilating manufacturers and others in the industry.

The Builders Building is the permanent location of the Builders Exposition, which includes a large number of working exhibits of heating equipment, oil and gas-fired boilers, and ventilating machinery.

"TENTACULAR" Higher Efficiency on Power Transmission



LARGE PAPER PLANT, NEW YORK TENTACULAR BELTED FAN

Motor 50 H. P.; 1160 R.P.M.; Motor Pulley 12" Dia.; Fan Pulley 54" Diameter; Center Distance 78 Inches; "Tentacular"—11" wide.

In spite of the pulley ratio on this drive there is no slip.
Name and full particulars on request.

"TENTACULAR"

Is easy on Bearings
Runs smooth and noiseless
Eliminates slippage and idlers

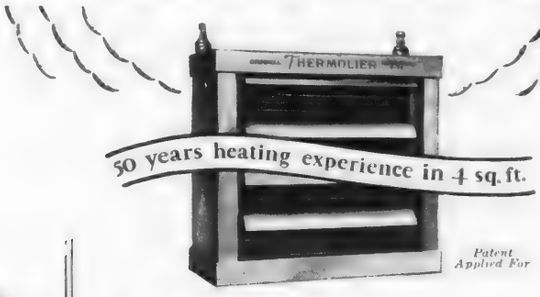
No special faced or
Grooved pulleys necessary
"A Tentacular Drive"
consists of
Two ordinary pulleys and one
"Tentacular" belt. That's All.

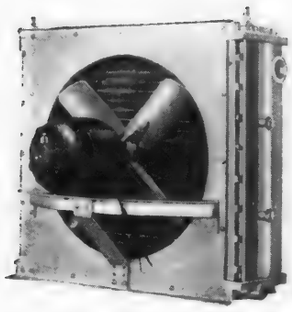
Let our Consulting Engineers give you definite facts and figures.

Ask for the new Tentacular manual on Engineering.

Alexander Brothers, Inc.
19 South Street, PHILADELPHIA, PA.
Sole Makers of Tentacular Transmission Belting
Branches and Distributors in All Principal Cities.

What makes GRINNELL THERMOLIER A *BETTER* UNIT HEATER



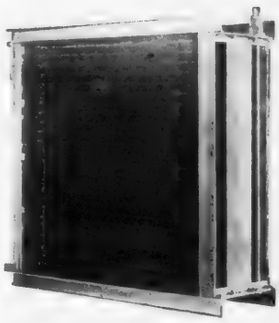


Fully enclosed, over-size, ball-bearing motor and aluminum fan.

A WORLD of sound practical experience built into the new Grinnell Thermolier makes it a rugged and efficient unit for industrial heating.

Even a hasty examination of the points of superiority here illustrated will convince any engineer that the Thermolier is worthy of closer study.

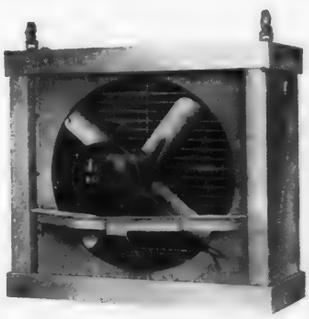
Our interesting booklet describing this unit gives complete details. It is invaluable to those interested in industrial heating problems. A copy is yours for the asking. Address your inquiry to Grinnell Co., Inc., 208 W. Exchange Street, Providence, R. I.



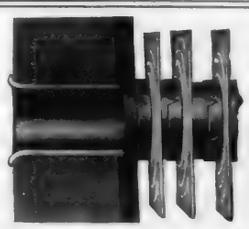
Heavy frame with ⅝ inch through-bolt hangers.

Simple piping connections, both on same side, with close return trap.

Unique header construction forces all condensation through integral cooling leg.

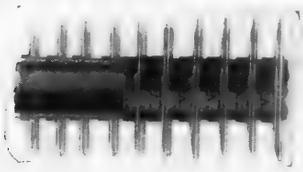


Copper housing makes for durability and fine appearance.

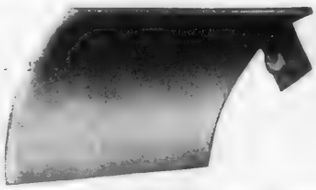


Tubes expanded into cast-iron header.

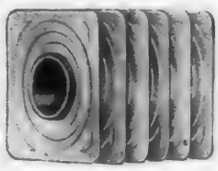
Perfect expansion bends take up all strains.



No flat horizontal surfaces to catch dirt.

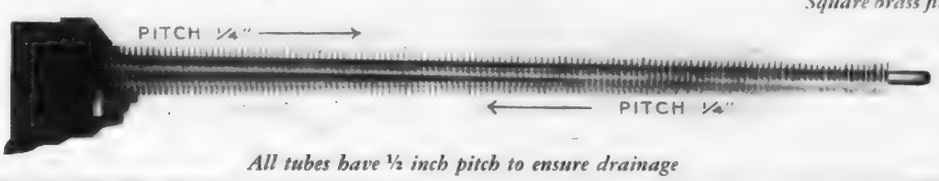


Independently adjustable copper louvers.



⅜ inch seamless copper tubing. Square brass fins.

Easily adjustable swivel socket hangers.



All tubes have ½ inch pitch to ensure drainage

GRINNELL COMPANY

Executive Offices: Providence, R. I. ***Branches in all Principal Cities***

Centennial Meeting of Central Supply Association

The one hundredth regular meeting of the Central Supply Association was held at the Palmer House, Chicago, April 11-12, over 500 being registered. The outstanding feature of the meeting was the presentation of the report of the Harvard Bureau of Business Research on the distribution cost of wholesaling heating and plumbing supplies. Following the report an extended discussion covered many of the points of greater interest. President F. N. Kretschmer presided over the meetings. Nine manufacturers and wholesalers were admitted to membership during the session.

Summerheat Sold on New Basis

Announcement is made that the new models "T", "S" and type "Ideal" of the Summerheat burner, manufactured by the Summerheat Corporation of America, Dowagiac, Mich., are to be marketed and backed by a "five-year rehabilitation bond." This instrument, delivered with each burner, provides that, at any time within five years from date of sale, the corporation will thoroughly rebuild, replace all worn or burned parts, overhaul and place in condition substantially as good as new, any model of the new series upon payment of $35 for models "T" and "S", and $25 for the type "Ideal." This apparently is a new idea applied to oil burners and should be a real factor in the sales campaign.

Cleveland Engineering Society Sponsors Exhibit

Utilizing the walls of a large room used for its meeting, the Cleveland Engineering Society has developed a system of exhibits of engineering equipment, rapidly increasing in numbers and quality. When alterations to the building are completed the meeting room will have a seating capacity of over 300 persons with 3200 sq. ft. of display space around the sides of the room.

Displays are placed on the floor or arranged on tables of standard design or in glass-covered, illuminated display panels on the walls, giving them a uniform and attractive appearance. It is stated that the total attendance is from 500 to 1000 technical men and industrial executives per month.

Changes of Address

Wagner Electric Corp., St. Louis, announces the removal of its New York City branch sales office from 50 Church Street, to 30 Church Street. The New York City service station remains at 321 West 54th Street.

L. J. Wing Mfg. Co., New York, has moved its general offices from 352 West 13th Street to larger quarters at 154 West 14th Street.

Walters Mfg. Co., Lancaster, Pa., has removed its offices and plant from 227 West Mifflin Street to larger quarters at Beaver and Mifflin Streets. The company manufactures radiator hangers and soon will produce a new line of pipe hangers.

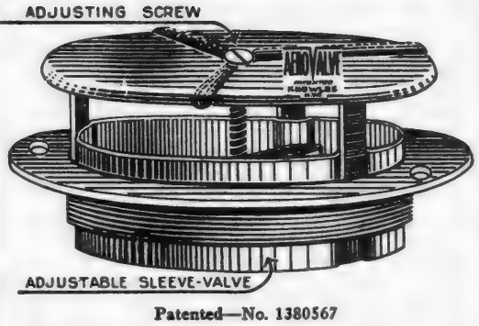
Hunter & Hudson, consulting engineers, announce the removal of their offices from 505 Rialto Bldg. to 41 Sutter Street, San Francisco, Calif.

American Oil Burner Association, Inc., is located in its new home at 420 Madison Ave., New York.

Manufacturers' Notes

American Radiator Co., New York, announces the removal of its accessories division from the headquarters staff in Chicago to the company's building at 40 West 40th Street, in New York. Executive direction will center here for the manufacture and sales of Airid air valves, Arco packless valves, Arco regulators, Mercoid controls and the line of Ideal heating accessories.

Knowles AERO VALVE



Patented—No. 1380567

A simple turn of the screw gives the finest possible regulation

The IMPROVED Mushroom Air Diffuser

Easier to Regulate
Cheaper to Install
and Priced Right

An up-to-date mechanically correct Air Unit of fixed height; made of heavy rolled steel. Adapted to fulfill every requirement of Architect, Engineer and Contractor.

It combines the maximum of efficiency with the utmost convenience of adjustment by means of a hollow cylindrical sleeve-valve, which moves easily up and down in the air space by simply turning adjusting screw on top of cap. It affords the finest control of air delivery properly deflected from dome shaped cap and is free from obstructions and air pockets when used as an exhaust unit. Installation is simple and economical.

Provided with sleeve as a complete unit ready to install, or separately, with or without protecting steel sleeve ring. (See booklet for detail data.)

Knowles Mushroom Ventilator Co.
202 Franklin St., New York City

MADE BY THE MAKERS OF THE FAMOUS "NU-NOTCH" MUSHROOM AND "DISC-LOC" GALLERY RISER VENT

New "The Sturdivane"

High over-all efficiency—quiet air delivery —*outstanding Sturdivane features!*

THIS new high speed ventilating fan follows the design and performance of the Sturtevant Silentvane Fans used to ventilate both the Holland Vehicular Tunnels connecting New York City and Jersey City and the Alameda Tunnel connecting Alameda and Oakland, California. It is a highly efficient fan, designed to meet all demands made upon a fan for ordinary ventilating duty.

A worthwhile saving in power consumption is effected by the Sturdivane because of its exceptionally high over-all efficiency. Its extremely low cut-off velocity assures quiet air delivery.

That the Sturdivane has a self-limiting horse-power characteristic is a point worth noting too. This feature prevents motor overload. It also eliminates the usual excess in motor size, thereby reducing initial motor costs.

There are many other Sturdivane features which will be sure to interest you. Complete information will gladly be furnished by our nearest office below.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Camden	Cleveland	Detroit	Kansas City	New York	St. Louis
Birmingham	Charlotte	Dallas	Hartford	Los Angeles	Pittsburgh	San Francisco
Boston	Chicago	Denver	Indianapolis	Minneapolis	Portland	Seattle
Buffalo	Cincinnati				Rochester	Washington

Canadian Offices at: Toronto, Montreal and Galt, Ont. Also Agents in Principal Foreign Countries

Sturtevant

REG. U. S. PAT. OFF.

VENTILATING, HEATING, AND POWER PLANT EQUIPMENT

B-Line Boiler Co., Cleveland, O., which was formerly the C. L. Bryant Corp., opened a district branch office and display room at 2401-15 Chestnut St., Philadelphia, with H. E. Lynch as district manager in charge.

Rome Brass Radiator Corp., 1 East 42nd St., New York, announces a new price list containing many substantial reductions in the price of Robras prime-surface radiator and complete bathroom units.

National Flue Cleaner Co., Groveville, N. J., manufacturer of soot blowers for fire-tube boilers, has appointed, as its Chicago representative, the Naylor-Hickey Corp., 643 Washington Blvd. The Furnace Improvement Co., 511 Westminster St., Providence, R. I., has been appointed New England representative.

Gorton Heating Corp., 96 Liberty St., New York, has issued a new trade price sheet, effective March 26, of specialties for the Gorton single-pipe vapor heating system. There has been no change in prices.

Cornell Utilities Corp., New York and Philadelphia distributor of the Nokol-Aetna oil burners, announces the appointment of C. L. Bode as general manager of the corporation.

Commonwealth Heating Co., 5921 North Clark St., Chicago, is the name of a new combine of heating contractors who are well known in the heating trade. The incorporators include J. A. Ljunggren, president, and A. A. Peterson, secretary and treasurer. Mr. Ljunggren was formerly connected with Wilson Bros., of Chicago, for 19 years. Mr. Peterson was formerly with the Progressive Heating Co., also of Chicago.

Monarch Metal Weatherstrip Co., St. Louis, Mo., has appointed Willard D. Smith sales director of the company. Mr. Smith formerly was general manager of the St. Louis Pump & Equipment Company, and more recently vice-president of the Yost Advertising Company.

Lincoln Electric Co., Cleveland, has appointed Jacob F. Savela as welding service manager for the Detroit district under the direction of J. M. Robinson, district sales manager.

August Buschmann & Sons, Inc., Indianapolis, Ind., dealers in wholesale plumbing and heating supplies, held two meetings in Buschmann Hall, March 5 and 6, for the purpose of directing attention to and displaying a recently completed showroom and the new Kohler colored ware. Both meetings were presided over by A. W. Buschmann. Among the speakers was George T. Wright, director of sales of the Bryan Steam Corp., Peru, Ind.

Pierce, Butler & Pierce Mfg. Corp., New York, announces as changes in its executive personnel, Stanley De Long, formerly vice-president in charge of manufacturing for the American Radiator Company, has been placed in charge of all manufacturing for the company. Henry E. Longwell has resigned as vice-president and advertising manager of the Pierce company, and Eugene B. Fliedner, his former assistant, has been appointed advertising manager.

Richardson & Boynton Co., New York, has appointed Walter D. Clark, manager of the Cincinnati office, to succeed Cooper Pogue; John Marquardt has succeeded J. P. Sheridan as manager of the Detroit office; Joseph Heenan, formerly with the Utica Heater Company, the Utica plant and its warm-air furnace lines and other interests having been acquired by the Richardson & Boynton Company, has been appointed manager of the Pittsburgh office, with headquarters in the Wabash Building.

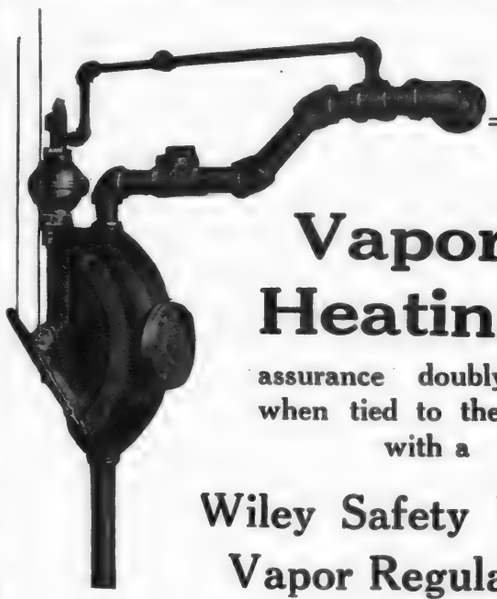
U. S. Radiator Corp., Detroit, has transferred T. R. Flanagan from its Troy, N. Y., sales office to the Baltimore branch, to serve as manager; E. F. Hackett will take the place of Mr. Flanagan at Troy, which office is a branch of the New York City district organization, in charge of Harry Booth.

Columbia Radiator Co., McKeesport, Pa., has appointed Walter C. Van Alen as representative in the Pittsburgh district. Mr. Van Alen, for 14 years in the heating and ventilating department of the Standard Sanitary Mfg. Company, will handle both jobbing and contracting interests of Triple Combustion boilers and Columbia radiators.

E Z
RADIATOR HANGER

FOR a beautiful heating installation use the slim, legless tube-type radiators. Hang them the convenient, labor-saving way with E-Z Hangers. One bolt. Wide range of adjustment both ways. Made for all tube and standard type radiators. Quick shipments.

HEALY-RUFF CO.
772 Hampden Ave., St. Paul, Minn.



Vapor Heating

assurance doubly sure when tied to the boiler with a

Wiley Safety Vent Vapor Regulator

Write for your copy of booklet describing the Wiley line of vapor heating specialties.

peerless quality product manufactured and sold exclusively by

The Simplex Heating Specialty Co.
(INC.)
Lynchburg, - Va.

He stopped the leak as best he could

OVER a long period of troublesome years, architects, contractors and owners of large buildings also have contended with leaks; *ever increasing steam leakages from Expansion Joints* used on heating pipe risers.

Joint packing, as was the Dutch boy's arm, is *only temporarily efficient.* A joint stuffed with commercial packing is bound to leak eventually. It is totally unfit for a vacuum system or a system where a slight vacuum is pulled.

The over-loaded pump fails to retain the vacuum, heating efficiency becomes poor, and fuel and repair costs multiply.

Sylphon PACKLESS EXPANSION JOINT

Allows Absolutely No Leakage

Its heart, the *all metal, original and genuine Sylphon Bellows* acts as a continuous yet flexible barrier to steam escape. It *is steam tight now, tomorrow or ten years from today,* requires no attention, and yet has perfect freedom of motion without risk of "jamming." It does away with "Expansion loops," those story-height *space wasters.* No more packed or "sliding sleeve" expansion joints, almost *impossible to repack* in the case of a riser concealed in furring.

Sylphon Packless Expansion Joints Are Easily Installed in the Vertical Riser

We will be glad to send you complete data, sizes, prices, and shipping weights. Use the coupon or write if you prefer.

The ORIGINAL GENUINE SYLPHON BELLOWS

The motor element in all Sylphon Instruments is the most accurate, durable and flexible temperature control unit known to science.

THE FULTON SYLPHON COMPANY, *Knoxville, Tenn., U. S. A.*

Sales Offices: New York, Chicago, Philadelphia, Boston, Detroit. All Principal Cities in the U. S. Dept. W

Gentlemen:

We are interested in the application of the Sylphon Packless Expansion Joint to

_____

Name_____

Company _____

Address _____

City _____ State _____

THE FULTON SYLPHON COMPANY — Sylphon — AUTOMATIC TEMPERATURE CONTROL

Security Stove & Mfg. Co., Kansas City, Mo., announces that the Lorne Engineering Co., of Detroit, Mich., has been appointed representative in Michigan and the Province of Ontario.

Bayley Blower Co., Milwaukee, Wis., has acquired all of the assets of the Bayley Mfg. Company, and will continue the manufacture and sale of the Bayley line of heating and air-conditioning equipment. The new president of the company, Philip Koering, has long been prominently identified with the road construction industry. He is secretary, treasurer and general manager of the Koering Company, builders of paving mixers with power boom and bucket distributor, patented by Mr. Koering. Other officers of the company are: Vice-president, Richard Kiel; secretary-treasurer, Fred Stadelbauer; chief engineer, C. J. Jackson; director of sales, E. Worthing, and W. C. Kussmaul, in charge of leather-drying work.

WANTED — Heating engineer with sales ability in engineering office. Must qualify either designing or sales. Commission basis. Position in Washington, D. C. Address Box 53, care of Heating and Ventilating Magazine.

SALES REPRESENTATIVES WANTED— Old established company, manufacturing high-grade vapor heating specialties, has some territories open, particularly in the West and South. This is the easiest system to sell as it is the only true single-pipe vapor system with consequent saving in installation cost. Commission basis. Lay-outs not necessary. State territory and other lines handled. All communications held strictly confidential. Address Box 52, care of Heating and Ventilating Magazine.

Classified Advertising

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

MANUFACTURER'S REPRESENTATIVE— Manufacturer of complete line of fans, air washers and unit heaters, desires recognized representatives on commission basis. Address Box 51, care of Heating and Ventilating Magazine.

MANUFACTURER WANTED

Manufacturers of sheet metal who are looking for new products, attention! Inventor has valuable patent on a yard incinerator for the disposal of rubbish and garbage. Used for homes, parks, schools, etc. Absolute necessity. Spark, wind, flame and rain-proof. Manufacturer wanted to make and distribute them on a royalty basis. Unlimited field. Demonstration. Edward Strube, 55 W. 42nd St., New York.

EXTENDED FIN RADIATION. — Integral castings. Extensions of alloy or copper. Have developed method of casting non-ferrous radiation giving lowest production costs. Highest efficiency. Need sales organization. Financial backing. Write E. S. Carey, Box 82, Clarks Summit, Pa.

CLIMB UPWARD TO *SUCCESS* THROUGH TECHNICAL TRAINING

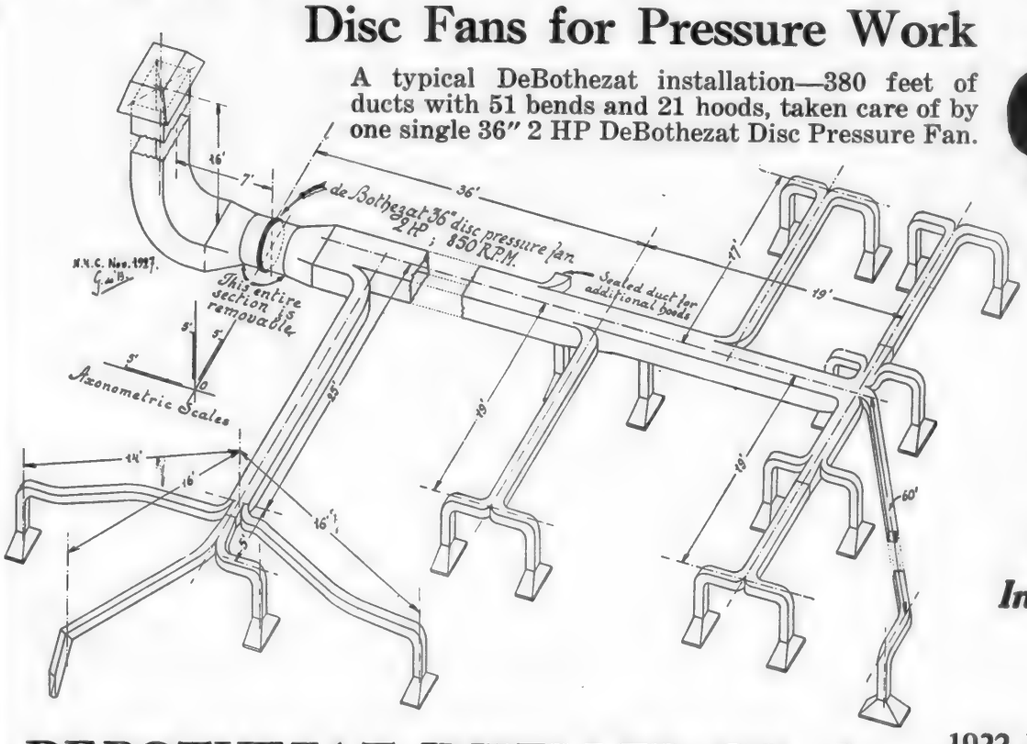
There is always room at the top for the technically trained man. For over 18 years, St. Louis Technical Institute has especially trained men for deserved promotion. An army of men have gained steady employment, higher salaries and more of the better things of life through our courses. You, too, achieve success through our engineering courses. Check the subject interested in, and send for full free information; no obligation.

- ☐ Heating and Ventilating Engineering.
- ☐ Special Steam and Water Heating.
- ☐ Scientific Warm Air Heating.
- ☐ Plumbing and Sanitary Engineering.
- ☐ Contracting and Estimating.
- ☐ Mechanical Drafting.

Saint Louis Technical Institute.
Est. 1910
The most thorough institution for Technical Home Study to-day.
4543 Clayton Avenue St. Louis, Mo.

Highly Efficient DeBothezat
Disc Fans for Pressure Work

A typical DeBothezat installation—380 feet of ducts with 51 bends and 21 hoods, taken care of by one single 36" 2 HP DeBothezat Disc Pressure Fan.



Write for Detailed Information

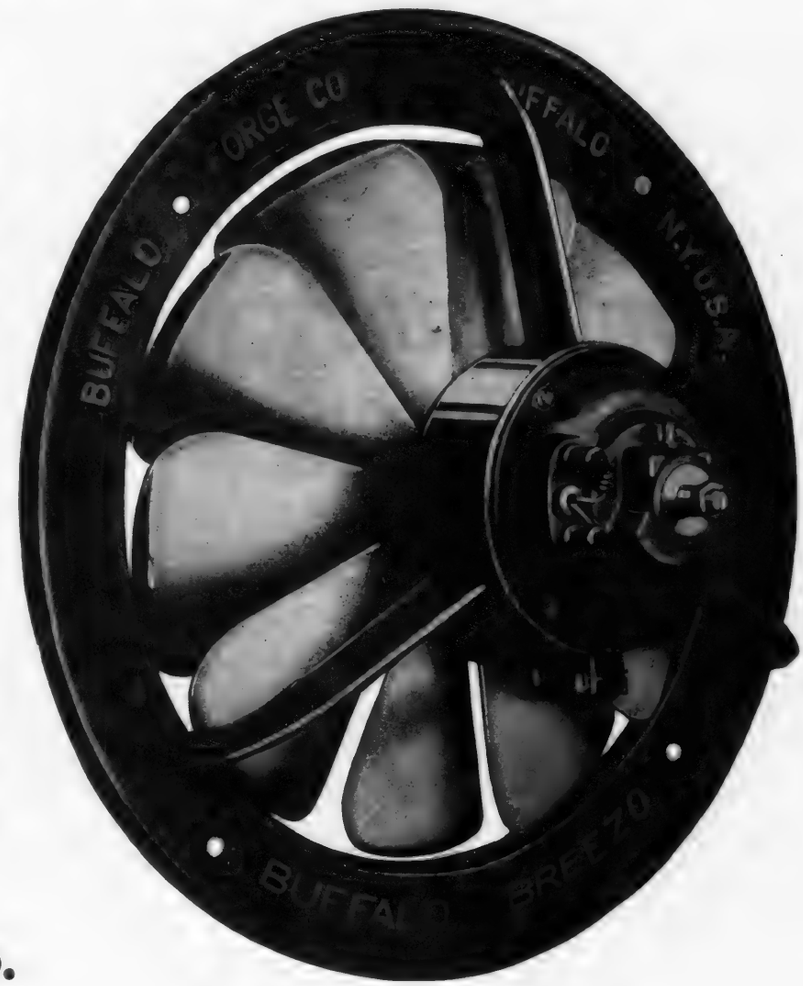
DEBOTHEZAT IMPELLER CO., Inc. 1922 Park Avenue New York City

Fresh air anywhere—with BREEZO

Better ventilation means more satisfactory living to all concerned — employer, employees and customers. In every industrial plant there are a few places where air is bad—where smoke or fumes affect the health of employees or retard production.

Put fresh air into those spots and note the improvement. BREEZO Ventilation is cheap. It costs little to purchase, very little to install—a trifle to operate. Its advantages are enormous.

Write to us to-day for recommendations and complete details on BREEZO fans to ventilate the particular building in which you're interested. There is no charge for our advice.



The "All-Steel" Fan

Steel blades, steel rim, steel motor brackets. Strong, lightweight, compact.

Buffalo Forge Co.

471 Broadway BUFFALO, N. Y.

In Canada—Canadian Blower & Forge Co., Ltd. Kitchener, Ont.

—for BETTER VENTILATION

"BUFFALO BREEZO"

Have you looked into this Unit Heater proposition

TO-DAY almost every trade paper you pick up has something to say about Unit Heaters — write-ups, editorials, advertisements. The reason is that Unit Heaters are now recognized almost universally as the best method of heating industrial buildings. The combination of low first cost and better heating service appeals strongly to the man who pays for and uses the heating system.

If you are thinking about Unit Heaters, the booklet shown at the left will be helpful. Send for it. And bear in mind that Peerless Unit Heaters are built in the same shops which produce the well-known PeerVent Heating and Ventilating Unit, used in school buildings throughout the country.

Mail this! with your letterhead, please

To Peerless Unit Ventilation Co., Inc.,
718-34 Crescent Ave.,
Bridgeport, Conn.

☐ Send booklet about Unit Heaters.

☐ Send your local representative.

H

PEERLESS UNIT VENTILATION CO., Inc.
718-34 Crescent Ave. :: :: :: BRIDGEPORT, CONN.

NEW YORK, 369 Lexington Ave.; BOSTON, 80 Boylston St.; BUFFALO, 135 University Ave.; HARRISBURG, 705 Telegraph Bldg.; CLEVELAND, 1836 Euclid Ave.; DETROIT, 1214 Lafayette Bldg.; CHICAGO, 808 Monadnock Bldg.; MINNEAPOLIS, 240 Seventh Ave. So.; PORTLAND, ORE., 927 Board of Trade Bldg.; TORONTO, CANADA, Darling Bros., Ltd., 77 York St.

PEERLESS

UNIT HEATER

Heating and Insulation Should Be Figured at the Same Time

THE heating requirements of a building are determined by the ability of the building to *hold* the heat that is generated.

Heat losses *must* be reckoned with. Heating and insulation should be figured at the same time. That is the scientific way—the way that decides whether a heating installation is to be the success that you and the owner want it to be.

This is especially true in all types of buildings having a large roof area. For more than sixteen years INSULITE—the wood-fiber insulating board—has been solving this important problem for engineers and architects.

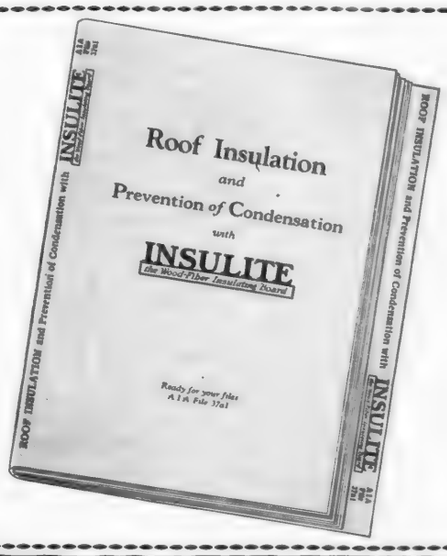
INSULITE is easy to handle. It has great strength. Waste through breakage is eliminated. Moisture and exposure does not injure it. For roof insulation it is made in two thicknesses—one inch and one-half inch.

The INSULITE engineering staff will be glad to hear from you with regard to any heating problem you may have in mind. The Insulation portfolio (see coupon below) is filled with interesting and helpful charts and data. Let us send you a copy of it.

The Insulite Co.

1204 Builders Exchange Minneapolis, Minn.

Fill out, tear off and mail the part below
Free Copy of the Insulation Portfolio will be sent



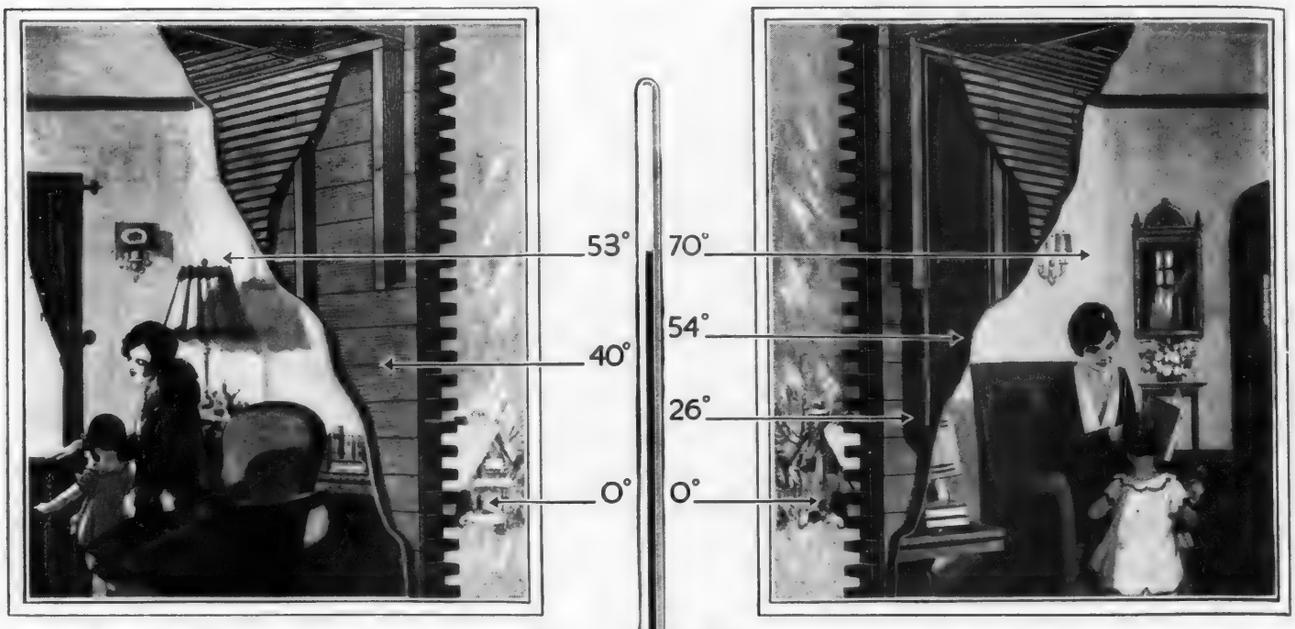
INSULITE
the Wood-Fiber Insulating Board

The Insulite Co.
1204 Builders Exchange, Minneapolis, Minn.
Please send your Insulation portfolio.

Name.....

Address.....

City..... State.....



Under exactly the same conditions, an insulated home will be heated to 70°, whereas the uninsulated home will be 53°. To bring the uninsulated home to 70° requires one-third more fuel.

2 air spaces
other methods require half again as much material

IF you install building insulation to create two air spaces within the wall, then ½-inch insulation will be just as effective as ¾-inch material applied in other ways. This is an important fact, proved by the U. S. Bureau of Standards. If you use insulation in contact with the sheathing or as a plaster base, you must use ¾-inch material to get the same results as with ½-inch installed in the center of the wall.

The economical thickness for walls, therefore, is ½-inch; the economical method is to install the thermal insulation so as to divide the wall into two air spaces.

FLAX-LI-NUM and the two-air-space method were created to work together. Its ½-inch sheets (actually 9/16-inch thick) come to the job ready to install between the studs. They go in easily, quickly, correctly and without waste.

One-inch insulation should be installed in your roof — for practically two-thirds of the heat losses occur there. One-inch FLAX-LI-NUM is actually 1⅛-inch thick. You have *only one piece to handle.* Again, FLAX-LI-NUM saves you money, gives you more material and a more effective job.

FLAX-LI-NUM is permanent, too. It is made solely from purified flax, compressed into semi-rigid sheets. It does not rot, nor does it tear, crack or puncture! It is just as thick, when finally installed, as when it left the factory. Send for the facts about the *two-air-space* method of insulating homes.

FLAX-LI-NUM INSULATING CO., ST. PAUL, MINN.

Flax-li-num

THE CORRECT BUILDING INSULATION AND SOUND CONTROL MATERIAL

The Modern Scientific Insulation

FLAX-LI-NUM is the *modern* thermal insulation — nothing but pure flax compressed to just the right firmness. So effective is this *scientific* insulation that 1 inch of it is equal to 16 inches of brick and mortar, or 27 inches of solid concrete in heat stopping qualities. The correct use of FLAX-LI-NUM will keep your home comfortably warm and save a full one-third of your fuel bill. In summer your home will be 10 to 15 degrees cooler than the outside.

Mail the coupon now.

FLAX-LI-NUM INSULATING CO.
St. Paul, Minnesota

Send me details of the two-air-space method of insulation and complete information about Flax-li-num.

H.V.-5

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City_____

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BUSINESS executives and professional men are quick to see the desirability of an office which is free from dust, smoke, drafts. The advantages of working in an atmosphere that is clean, invigorating and constantly comfortable in temperature are obvious.

They are attracted, therefore, to offices equipped with the Univent—because the Univent makes these ideal conditions possible. Windows may remain shut . . . the Univent draws fresh air directly from out of doors; cleans it; warms it when necessary; circulates it gently and silently to every corner of the room.

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There are no drafts—no fluttering papers. Disturbing noises from the outside world are subdued. The 4 o'clock let-down becomes a thing of the past. Minds are alert—efficiency remains at a high level all day long.

Heating engineers, architects, business men, building managers, school executives everywhere endorse the Univent for its economy, flexibility, and ease of control. Mail coupon for book of facts.

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THE HERMAN NELSON CORPORATION
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Please send, without cost or obligation, your book No. 24 explaining Univent Ventilation.

Name.....

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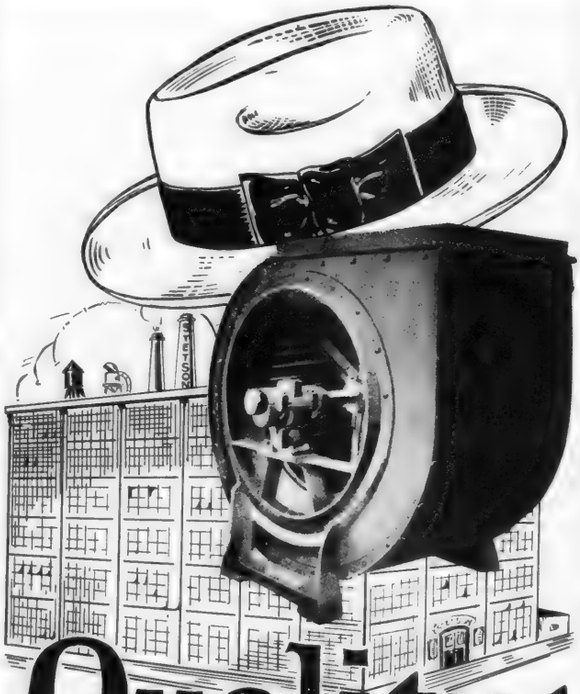

Quality'

WHEN we think of Stetson hats, we think of quality and fine workmanship. In acquiring and maintaining this high standard, which has made Stetson hats so well-known throughout the country, the manufacturers of these hats did not overlook the importance of proper working conditions.

A careful selection of equipment to handle the air in a plant resulted in the installation of Garden City Fans. These fans have been giving long, uninterrupted service and are faithfully performing their duty in maintaining the high quality of Stetson hats.

Since 1879, Garden City Fans have been used with complete satisfaction by thousands of users. The scientific and mechanical design and construction insure noiseless and continuous operation.

Architects and engineers who are familiar with Garden City Fans know that they can safely specify them in their quality specifications. Made in various types and sizes to meet all requirements.

Also manufacturers of Cyclo-Fin Unit Heaters and all types of fans and blowers.

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Garden City Fan Company
Manufacturers Since 1879
McCormick Bldg., Chicago, Ill.
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EMERSON EXHAUST FANS

12 inch
16 inch
18 inch
24 inch
30 inch
and 36 inch.

Every refinement that assures sturdy, powerful, quiet service. Well adapted for unit heater use. Powered with fully enclosed Emerson motors, specially designed for exhaust fan service . . . Ventilating fans and accessories, including louvres, wall boxes and mounting panels. Complete cooperation by Emerson Engineering Department in planning installations.

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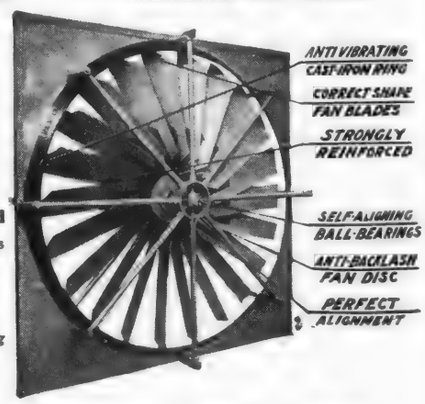
BUILT TO LAST
EMERSON MOTORS *and* **FANS**

TYPHOON

Multiblade Disc Blower



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Typhoon Products and Typhoon Systems have been installed all over the country and all over the world. Typhoon is an international standard of efficiency for cooling, heating, and ventilating systems.

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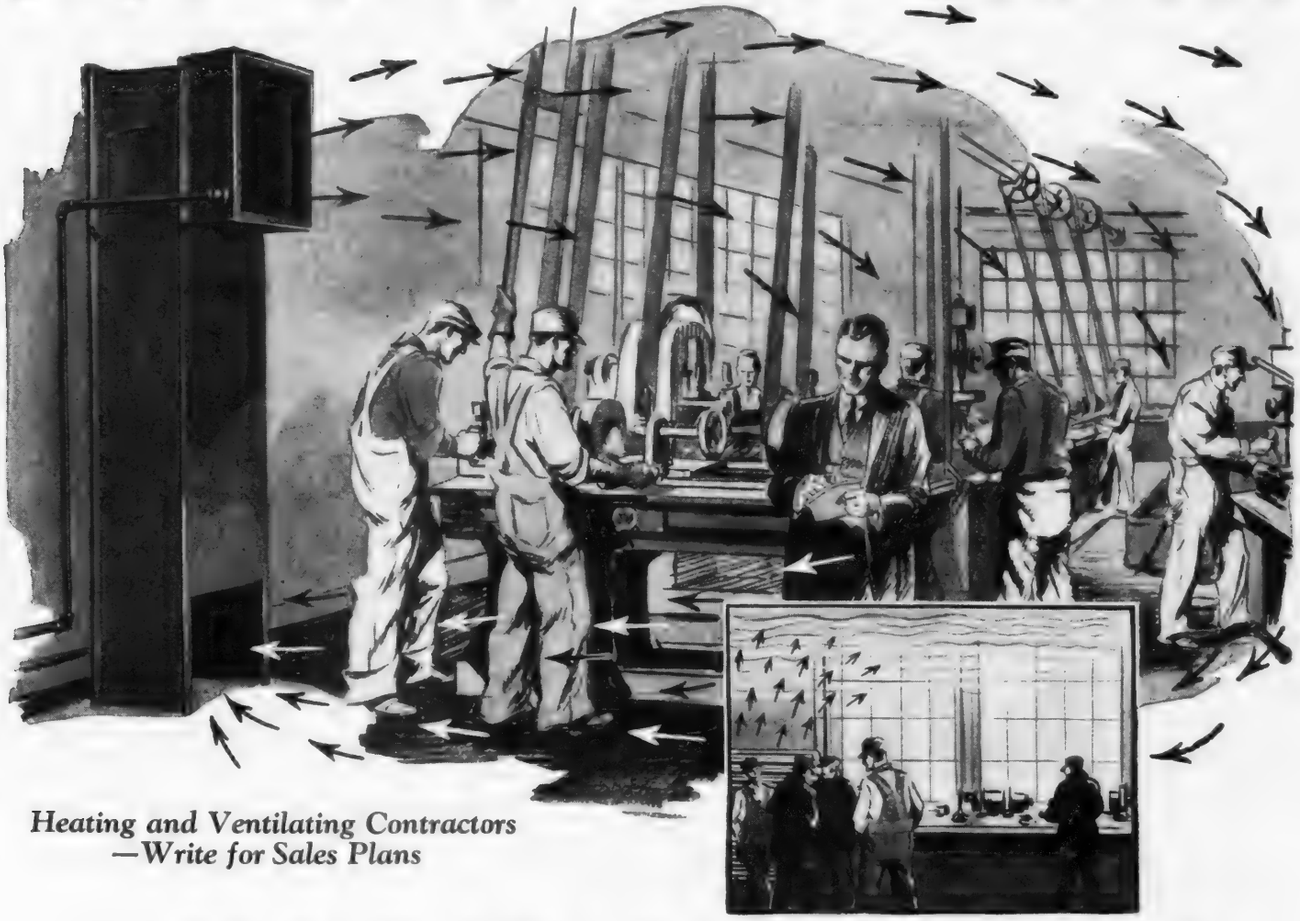
Dealers' and engineers' inquiries invited

HEAT WITH UNIT HEATERS



Heating and Ventilating Contractors —Write for Sales Plans

BRING HEAT TO WORKERS —*Not* WORKERS TO HEAT

Heated air at the ceiling and cold air at the floor—or warm air everywhere—take your choice.

Ordinary heating methods, radiators, wall coils, etc., turn cold air into heated air. The general tendency of heated air under normal conditions is to rise and pack against the ceiling. Costly heat units leak away, or remain above working areas—and you foot the bill.

Venturafin Unit Heaters keep the heated air from rising. Quiet, economical fans circulate heated air throughout the room forcing a mixture with the cooler air at lower levels. Result: *warm air everywhere*, less heat loss, more even distribution of heat, better heat control—and comfortable working conditions everywhere *at less cost.*

What is your business? Have you a store, factory, warehouse, garage, showroom—? Whatever it is, don't throw up your hands in despair at your heating cost or difficulty until you discuss the Venturafin method of unit heating with an American Blower dealer. There is a style and type of Venturafin unit for practically every heating need ranging in capacity from 450 cubic feet of heated air per minute to 8000 cubic feet of heated air per minute.

AMERICAN BLOWER CORP., DETROIT, MICHIGAN
CANADIAN SIROCCO CO., LTD., WINDSOR, ONTARIO
BRANCH OFFICES IN ALL PRINCIPAL CITIES

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American Blower

"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

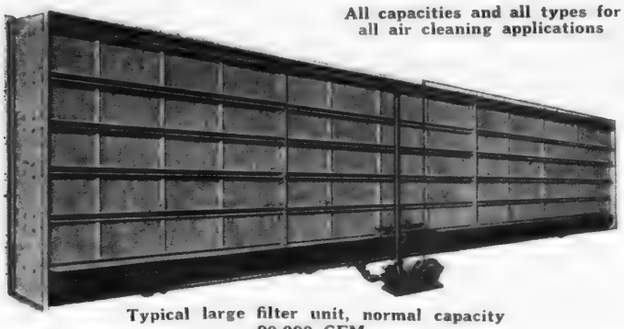
The Air Filter that is Winning Universal Favor

because

It completely eliminates the human element from filter operation.
It combines maximum air cleaning efficiency with low resistance to air flow.
Its effective self-washing system automatically maintains the initial high efficiency and low resistance throughout the life of the filter.
It is simple, sturdy and positive, with no moving parts but the oil pump and the sediment ejector.
It occupies less floor space per capacity than any other filter.
Its erection, operation and maintenance costs are surprisingly low.
It has proved, in installations all over the country, that these are not merely claims, **but actual facts.**

ACE Automatic, Self-Cleaning AIR FILTER

All capacities and all types for all air cleaning applications



Typical large filter unit, normal capacity 90,000 CFM.

Full and capable co-operation with Architects, Heating and Ventilating Engineers, Contractors, Business and Industrial Executives, is offered on all air cleaning and conditioning problems.

Write for complete information and quotations

General Air Filters Corp.
Division The W. B. Connor Co. Inc.
369A Lexington Ave., New York

Manufacturers of Air Conditioning Equipment, Air Filters, Air Washers, Spray Nozzles

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CONTROL THE SPEED OF YOUR VENTILATING EQUIPMENT!
REGULATE WARM AND COLD AIR VOLUME
WITH THE TIME TESTED
HORTON VARIABLE SPEED PULLEY

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3008-3016 University Avenue S.E., Minneapolis, Minn.
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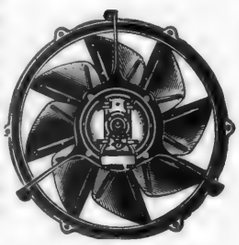
JAMES M. SEYMOUR
Established 1888
Lawrence St., Mechanic St. and Kirk Place, NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.



Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.

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AIR DIFFUSERS

SINCE 1908
Kauffman Air Diffusers
HAVE BEEN IN USE IN
Some of America's Finest Theatres
Simple to Install—Low in Price
Graduated Air Control

AMERICAN METAL PRODUCTS CORP.
ST. LOUIS, U. S. A.

Can you think of a harder place to heat?

Hangar at the Lakehurst, (N. J.) Naval Air Station, the largest single enclosed space in the world—962 feet long, 348 feet wide, 200 feet high—57,120,000 cubic feet

THERE is room in this great hangar to house two giant airships the size of the Los Angeles, and still have room for several smaller ships. Think of the volume of air in such a building! Yet the task of providing an effective heating system for this mammoth enclosure did not prove difficult for Skinner Engineers.

Ever since Henry Baetz, now Chief Engineer, originated the unit method of industrial heating, over a third of a century ago, Skinner Engineers have been adapting that method successfully to all types of buildings. The design of the heating system for this famous hangar was just one of the thousands of experiences that have prepared Skinner Engineers better than anyone else to give you

True "Work-Area" Heating at Less Cost for Installation and Operation

"Work-Area" Heating is simply heat delivered where your producers are working, not wasted up at the roof. True "work-area" heating is achieved by the use of the Skinner (Baetz Patent) Air Heater. A special multivane fan, housed in the Air Heater, spreads a blanket of warmed air over the room. At the same time, air from the floor level is drawn into the heater and passed thru nested steam coils. As the air drawn from the floor level must be replaced, the heated layer is pulled right down into the "work-area". This gives

Perfect Uniformity of warmth over the entire room

—every worker is comfortable, production is high.

Isn't it easy to see the saving made possible by this combination? The heating knowledge of Skinner Engineers assures you of a *saving on installation costs.* The effectiveness of the Skinner Air Heater *saves you money on fuel.*

See phone book for branches in:

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Factories at St. Louis and Elizabeth, N. J.

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Skinner Bros. Mfg. Co., Inc.,
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I am interested in:

- ☐ Heaters
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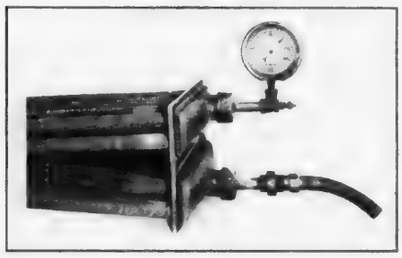
Skinner Brothers *Engineered* Heating

1450-90 S. Vandeventer, St. Louis, Mo. **New York Office: 1710 Flatiron Bldg.**

Originators of the Unit Method of "Work-Area" Heating

"I believe... *this* York Super-Fin Coil *for Blast Radiation offers more sound engineering advantages than has ever before been available in the heating field"*

—From a prominent engineer.
(Name on request)



YORK SUPER-FIN combines the high heating efficiency of scientifically designed extended surface radiation with *amazing strength and flexibility.*

Every unit is tested at 1000 pounds hydrostatic pressure and guaranteed for 200 pounds working pressure. The danger from expansion and contraction has been entirely eliminated by U-tube construction and fused metal joints.

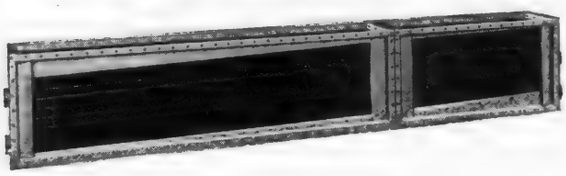
Supply and return are at the same end. This permits end-to-end as well as vertical stacking.

The range of sizes fits any condition. There are 1, 2, 3 or 4 nominal tube depths in one casing. Casings are 12" thick, either 23" or 35" high, in several lengths.

A new Bulletin just off the press fully describes York Super-Fin and gives all necessary engineering data. Copies will be gladly sent on request. York Heating and Ventilating Corporation, 1539 Sansom Street, Philadelphia.

YORK SUPER-FIN RADIATION

YORK SUPER-FIN



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Controlled Fresh Air

Getting enough fresh air without drafts is a difficult problem without the proper ventilation. The Turtleback Air Diffuser is designed to admit air with greater velocity, maintaining a constant flow, without discomfort to those in the immediate vicinity.

The amount of fresh air may be closely regulated with only one screw in center of top to manipulate. There are no parts that may become loose or rattle. The Turtleback is made entirely of cast-iron, which will withstand unusual wear and abuse. Easy to install and economical because there are no replacements.

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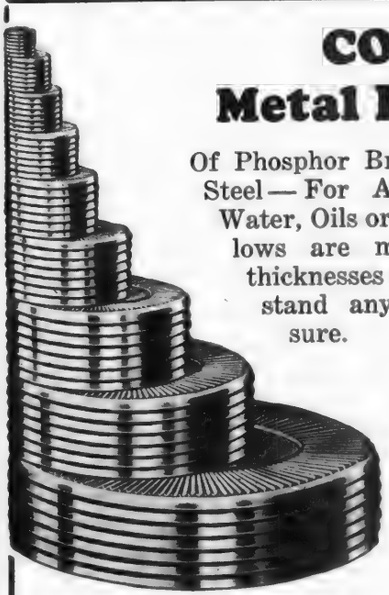
2800 Cottage Grove Ave., Chicago, Ill.

COOK Metal Bellows



Of Phosphor Bronze, Monel and Steel — For Air, Gas, Steam, Water, Oils or Acids. Cook Bellows are made of various thicknesses of metal to withstand any practical pressure.

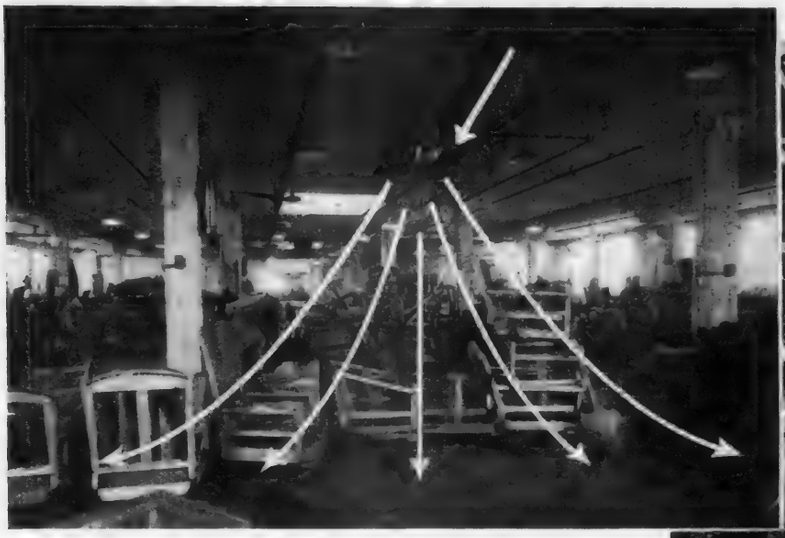
Cook Bellows are made with a joint of unique and new design, and are produced by a new process. Made in several sizes and to any length.

A uniformly high grade product at a comparatively low cost.

Our engineers will be glad to discuss the adaptability of the Cook bellows to your particular device.

COOK ELECTRIC COMPANY
2700 Southport Ave., CHICAGO

Heat with Unit Heaters



Wing Featherweight Unit Heater in Furniture Factory

Wing Featherweight Unit Heaters Put a Blanket of Warm Air About the Working Floor

Five Wing Unit Heaters heat this large industrial building of the General Electric Company.

A B. T. U. at the work floor is worth two at the roof!

HEAT is wanted at the working floor—not at the roof. Wing Featherweight Unit Heaters put warmth and comfort at the working level—where it is wanted.

By downward circulation of air, Wing Featherweight Unit Heaters prevent the accumulation of high temperature air in the upper spaces.

The Wing principle of vertical projection of warm air to the production floor is based on common sense. By constantly withdrawing air from the upper areas, there is no opportunity for B.T.U.'s to collect and disappear through roof and upper side walls. Thus waste is prevented.

Easy Installation

Overhead location of heating units makes it a very simple matter to install the Wing System. All piping is carried overhead (no trenches) in straight line runs, with a minimum of connections and fittings. This simplicity of installation makes every Wing job clean-cut.

Get the Wing Heater Bulletin. It will give you the Wing Method of correct factory heating. The coupon below is for your convenience in asking for this bulletin.

L. J. WING MFG. CO.

158 West 14th St., New York

L. J. WING MFG. Co.,
158 West 14th St.,
New York, N. Y.

Please send me, without obligation, the Wing Heater Bulletin which gives full information on the Wing Method of Factory Heating.

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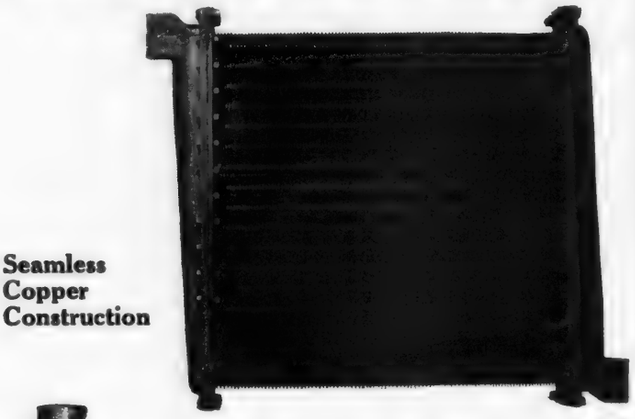
HELICALFIN



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EXTENDED SURFACE RADIATION

Meets the Demands of Modern Heating and Ventilating Progress

For Permanence and High Efficiency Specify

Rome Helicalfin Tubing

Helicalfin Heater Units and Radiators offer great advantages in high efficiency. The cores consist of tubes and headers made of copper and brass. They are sturdy, compact, light in weight, and last indefinitely with practically no corrosion.

Helicalfin Heater Units and Radiators are the ideal heating equipment for Homes, Schools, Institutions and Industrial Plants.

Rome Helicalfin Radiation has from five to nine times radiating surface of plain tube with proportionate increase in efficiency.

Engineering data covering the performance of Rome HELICALFIN Heaters has been prepared by a nationally known test engineer and is available upon request.

Makers of Good Radiators since 1905

ROME-TURNEY RADIATOR COMPANY
ROME, N. Y.

DURIRON FANS *for* Acid Fumes

DURIRON—the universal acid resistant—is a cast metal alloy, and so needs no surface coating or treatment to insure service.

Duriron Exhaust Fans are efficient units that may be operated at much higher speeds than other resistant materials, giving them correspondingly greater capacities than other units of like size.

Simplicity of design and construction assures day-in-and-day-out operation with little attention beyond occasional oiling.

Constructive cooperation by an engineering force with wide experience in corrosive fume exhausting is offered without obligation.

DURIRON FAN No. 45—Motor Driven
Clockwise Up Blast Discharge

The No. 45 Duriron Fan has a capacity running from 100 to 450 cubic feet per minute. It has openings arranged for six inch inside diameter pipe connections, and is furnished with ½ H.P. motor of practically any characteristics. The weight complete is about 160 pounds.

For your files, let us send "Bulletin No. 140-A".

Duriron is produced only by

The DURIRON COMPANY DAYTON·OHIO

Not a sound—

from the "Silent" Sturtevant to disturb the quiet schoolroom

THE "Silent" Sturtevant Unit Ventilator fits unobtrusively into the quiet atmosphere of the schoolroom, church or office.

No disturbing sound comes from the attractive metal cabinet to betray the fact that fan and motor are at work supplying healthful, fresh air. A well-ventilated room, alone, testifies to their efficient operation.

Silent unit ventilation is an outstanding Sturtevant achievement. Because of the special design of the fan wheels used in the "Silent" Sturtevant Unit Ventilator the air is moved noiselessly, and in addition a saving in electric power is effected.

Silent unit ventilation is an exclusive Sturtevant attainment. Our nearest office will gladly send you Bulletin 344-A which gives complete information about the "Silent" Sturtevant.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Camden	Cleveland	Detroit	Kansas City	New York	St. Louis
Birmingham	Charlotte	Dallas	Hartford	Los Angeles	Pittsburgh	San Francisco
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Sturtevant REG. U.S. PAT. OFF. *the Silent Unit Ventilator*

SPRACO Filter Cell.

Air Filters

that clean properly because they are built on the right principle

Cleaning the air of dust, dirt and foreign matter is simple enough with the right equipment.

Spraco Air Filters do this most efficiently and economically because of the following reasons: The filter media provides the greatest possible dust collecting surface within a given space, and is arranged so as to change abruptly and continuously the small streams of air passing through it. It consists of a stack of expanded metal sheets arranged from coarse to fine in direction of air flow. It is made adhesive by dipping or charging the cell with a special solution called "Dustix." *Air cannot pass through this media without being effectively cleaned.*

The progressive arrangement of the media from coarse to fine mesh insures high cleaning efficiency with minimum obstruction to air flow.

The use of sectional framework is another important advantage of Spraco Air Filters. It eliminates air leakage, insures perfect alignment and greater strength and rigidity, and low cost of erection. Each section accommodates several cells and can be made to fit the space available. All metal construction.

Consult us about your air filtering, conditioning, washing and cooling problems. Ask for Bulletin F-81.

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60 High Street, Boston, Mass.

Cooling Ponds
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Air Washers
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Cable Address: "SPRACO," Boston; Western Union Code

Vertical

BALDOR
A BETTER MOTOR

Horizontal

Vertical motors need no longer be considered special construction. Many difficult mounting problems are solved by the use of Baldor Motors combining all the good qualities of horizontal motors with co-operatively engineered vertical mountings.
"Outstandingly successful" is the comment on Baldor vertical applications in the pump field. Write for Data.

BALDOR ELECTRIC COMPANY
4356 DUNCAN AVE., ST. LOUIS, MO.

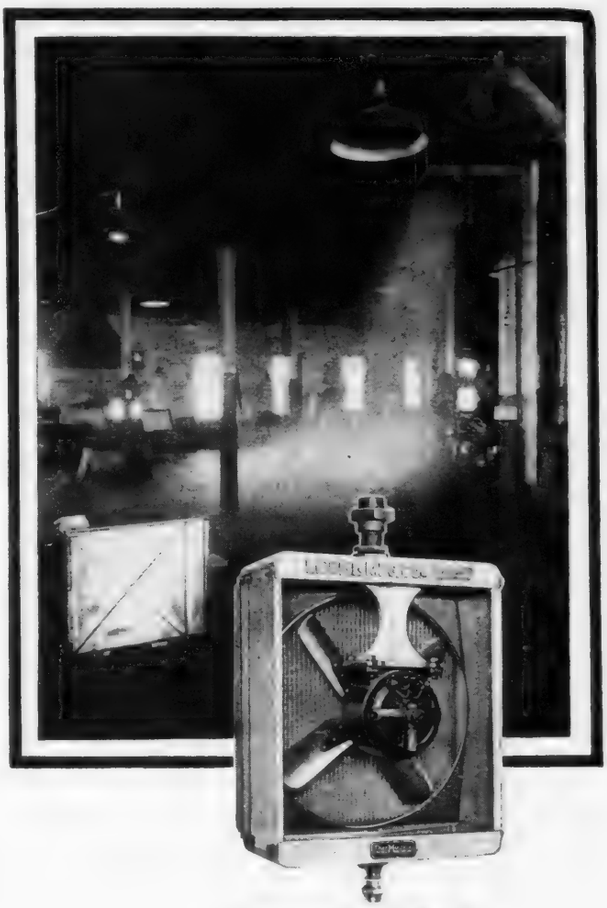
HARTMANN
RADIATOR BRACKETS

THREE STYLES
AR NR NV

Write for Descriptive Circular and Price List

CHARLES HARTMANN CO.
975-993 Dean Street BROOKLYN, N. Y.

heat! Delivered and kept where *you* want it



Thermodine Unit Heater No. 701 — there's a Thermodine for every size space.

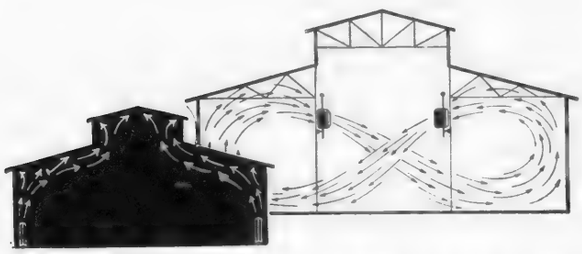


Diagram shows how Thermodine Unit Heaters circulate heated air. Below—Course of heated air circulation where c. i. radiation is used.

THERMODINE Unit Heaters not only put a generous volume of heat where it's needed—they keep it there. Keep it where it is needed most, in the working area.

The unretouched photograph above of a "smoke bomb test" graphically illustrates how Thermodine Unit Heaters project heat to the floor. And the heat rises only to the plane of the heaters where it is drawn in by the fans, reheated and again projected down to the floor. A constant circulation of heated air in the working zone. Little heat is allowed to escape above the plane of the heaters, to be wasted at the roof.

The many other advantages of Thermodine Unit Heaters warrant your closer investigation. Let us send you Catalog No. 127.

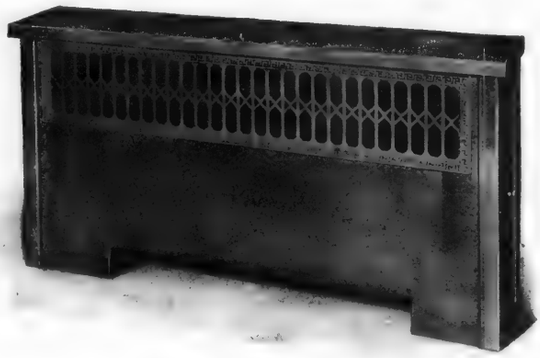
London, England, Office:
S. G. LEACH,
26-30 Artillery Lane.

MODINE MANUFACTURING CO., (*Heating Division*)
1707 Racine St. *Branch Offices in all large cities* RACINE, WIS.

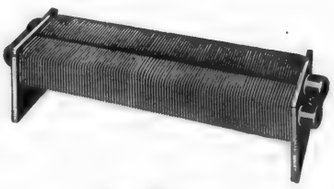
ThermoDine Unit HEATER

A MODINE Product

FOR STEAM OR HOT WATER HEATING SYSTEMS



Convecto Cabinet



Heat Unit
Light in weight—Compact

Convecto Radiators and Heat Cabinets

For the modern home, apartments, and public buildings, meet the present requirements of the heating engineers and architects with advanced ideas.

Convecto Radiators are made for all purposes. Heat units are all copper or combinations of copper, brass and steel, and manufactured under a patented expanding process, the only extended surface radiation of its kind made. The heat units are rugged in construction and made for lifetime service.

Convecto Cabinets are capable of finish and artistic appearance to meet the requirements of people of refinement and taste.

Complete Information in our new catalog just issued.

METAL STAMPING CO.

Long Island City **New York, N. Y.**

You are invited

to ask for a copy of this catalog. Check off those items in which you are interested, mail to us, and you will receive the catalog, prices, and whatever information you want on Atlas Regulating Devices.

☐ Reducing Valves
☐ Damper Regulators
☐ Temperature Regulators
☐ Pump Governors
☐ Float Valves
☐ Swing Joint Fittings
☐ Bronze Unions
☐ Thermostats
☐ Balanced Valves

Name .....

Firm .....

Address .....

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South Street, Newark, N. J.

THERMOSTATIC METAL

The most accurate, constant and durable of expansion units

FOR LOW AND HIGH TEMPERATURES

Our No. 1800 metal for temperatures below 450° F.
Our No. 2600 metal for temperatures below 1500° F.
Other High Heat Metals for special uses.

Positive and Dependable Thermostatic Metals

W. M. CHACE VALVE COMPANY
1600 Beard Avenue
Detroit, Michigan

MANUFACTURED WEATHER

Carrier
AIR CONDITIONING AND DRYING EQUIPMENT

makes

"Every day a *good* day"
Air Conditioning

Humidification, Dehumidification
Centrifugal Refrigeration
Cooling of Public and Industrial Buildings
Temperature and Humidity Control

DRYING AND PROCESSING

Carrier Engineering Corporation
Offices and Laboratories
NEWARK, NEW JERSEY

SALES OFFICES

New York Philadelphia
Boston Chicago
Cleveland
Los Angeles
Kansas City
Washington

See our detailed data in A. S. H. & V. E. Guide.

Literature on request. Write concerning your specific problem.

This is Our Idea of an Efficient Centrifugal Fan —do you agree with us?

—maximum air delivery against low or medium high resistance from a minimum of housing; construction as equally adaptable to high as to low pressures and as practicable for double as for single width fans.

— strong, yet light, quietness in operation; mechanically of the highest obtainable efficiency.

— blast wheel of net-work or plexiform construction to provide maximum strength from the minimum of material weight.

—large and unobstructed inlets and outlets; small housings.

—blast wheel construction on a balanced center and built up with parts of uniform weight and gauge, thus making the blast wheel, when assembled, in balance.

The Plexiform Fan—light, easy running, low operating cost. Made in various sizes and types for engine, motor or line shaft drive.

That briefly is the Bayley concept of an efficient centrifugal fan and the manner in which the Bayley Plexiform Fan is built. Scores of installations have proven it successful. May we tell you where they are and state the argument more fully by means of our Bulletin No. 26.

BAYLEY BLOWER COMPANY

742 Greenbush Street Milwaukee, Wis.

Bayley

AIR ENGINEERING & EQUIPMENT

HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS—PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS

Quicker—Better Heating with the Beautiful

McQUAY Cabinet RADIATOR

The Cabinet of heavy furniture steel can be painted any color. It's a thing of real beauty. Made in most every size and dimension to fit any desired space.

Cold air from the floor enters the cabinet at the bottom, passes thru the heating unit, and is impelled thru the grille with sufficient velocity to insure *positive circulation. Quicker Heating.* A water chamber above the heating unit humidifies the air. *Healthful Heating.*

The heating unit consists of a series of flat horizontal tubes, coated with tin inside, securely held in place by copper fins, and firmly nested in bronze metal headers. It is immune from rust and corrosion — *will not "clog,"* and is practically indestructible.

Actual tests prove that McQuay Cabinet Radiators heat quicker and are *far more efficient than ordinary types,* without the usual "bulky ugliness." Yet their cost installed is only slightly more than for ordinary radiators.

The complete McQuay Line includes unit heaters and concealed radiation. Ask for literature.

McQUAY RADIATOR CORPORATION

General Sales Office—Pure Oil Bldg.—CHICAGO
Eastern Branch—2148 Graybar Bldg., New York City
Branches in most principal cities.

Now Is the Time...

to check up on the performance of VENTILATING SYSTEMS—in preparation for coming summer weather.

—by installing BRISTOL'S RECORDING THERMOMETERS at various points about the system, such a check-up is greatly simplified. The permanent chart records secured show what temperatures are maintained during every moment of the day and night.

—which makes it comparatively easy to figure equipment efficiency, and determine what improvements, if any, are necessary. The simple, rugged construction of Bristol's Recording Thermometers assures accuracy and trouble-free operation.

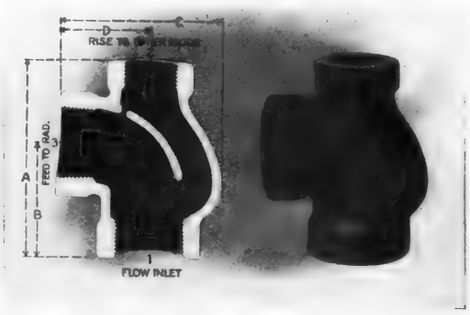
Write for any further information desired.

The Bristol Company

Waterbury, Connecticut

Blake Testite O. S. Distributor Fittings

SAVE FITTINGS, LABOR, FUEL— INCREASE CIRCULATION



For Hot Water Heating Systems and Domestic Hot Water Supply

Perfect Control of the Circulation. No Short Circuiting. The Lip Distributes the Water Evenly

Made in 39 Sizes
Your Jobber Will Furnish Them

BLAKE SPECIALTY COMPANY
ROCK ISLAND, ILLINOIS

Good Ventilation is not Expensive

Simply Specify the

Lakeside

Electric VENTILATOR

Ventilation has reached the point where it is recognized as a vital necessity by architects, engineers and business executives. Today it is not a question as to the advantages of efficient ventilation, but rather, from a standpoint of cost plus efficiency, "Which ventilating system shall I install?"

Lakeside Engineers have designed a complete electric ventilating system, obtainable in various sizes to fit practically every type of installation, that is highly efficient, quiet in operation, low in operating cost, and so well constructed that it means years and years of dependable service.

Fresh Air Without Draft

The new type L-1 Lakeside Electric Ventilator is equipped with our exclusive Four-Way Air Deflector which deflects fresh, outside air to any and all parts of the room desired. Thirty-two individual blades furnish the maximum volume of air and nine adjustable deflector blades (four horizontal and five vertical) control the direction of the air current. Equipped with self-aligning SKF Bearings, specially designed impeller silent Tex-rope Drive. ¾ H.P. variable speed motor.

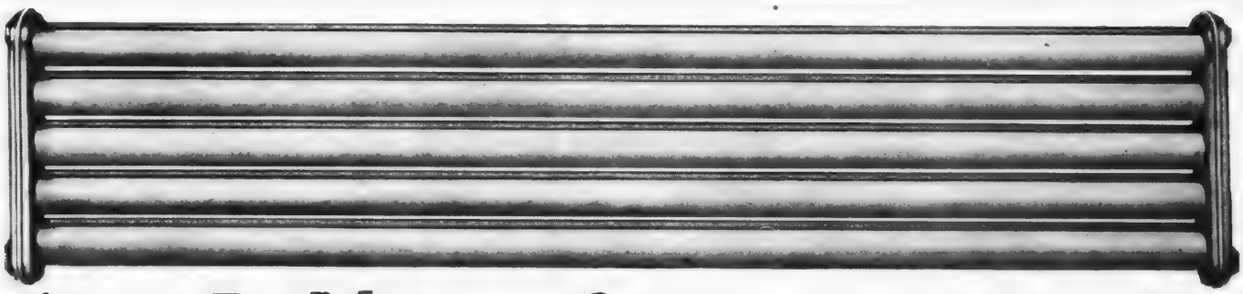
VENTILATING IXL SYSTEM

Easy to Install

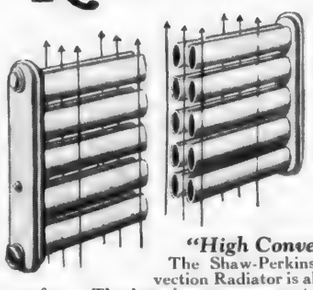
The Lakeside comes ready for installation. It requires no tearing down of walls or ripping up of floors. It can be dismantled to move through small openings and installed in many places where it is impossible to figure on other types of ventilating systems. The Lakeside is very low priced, yet it is backed by an iron-clad guarantee. This is your protection and ours.

Write for Specifications and catalog of the complete line of Lakeside Electric Ventilators

THE LAKESIDE COMPANY - - 107 Main Street, Hermansville, Michigan



Shaw-Perkins
HIGH CONVECTION
Radiators



"High Convection"
The Shaw-Perkins High Convection Radiator is all prime heating surface. The ingenious arrangement of the oval tubes allows the air to pass freely over the tubes, unimpeded by fins, baffles, or top and bottom hub connections, consequently the radiator has a high heat emission by convection.

Send for Catalog

Narrow One-Piece Radiators as Long as 14 Feet

Light in Weight: Shaw-Perkins High Convection Radiators are built in low, narrow one piece, jointless units, as long as 14 feet and weigh about one-third as much as other forms of direct radiation.

Heat and Cool Quickly: The light uniform walls cause them to respond promptly to the turn of the valve, giving quick and positive control over room temperatures.

Save Space: The radiators occupy about one-third less space than other forms of direct radiation. Brackets or legs can be supplied for either wall or floor installation.

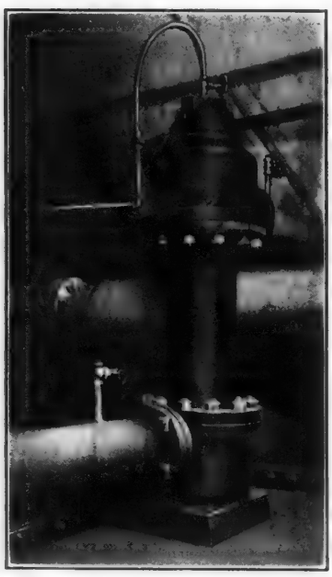
Absolutely Sanitary: The radiators have no rough surfaces or fins to act as dust entanglements. All surfaces are smooth and easily accessible for hand wiping.

Unusually Adaptable: The light weight, the distinctive design and the unique dimensions of the radiators, make them suitable for installation in heating plants, upon walls, under windows, in recesses, upon columns, pilasters, etc. They are also particularly adapted to various drying and cooling purposes and to many industrial uses.

Get the Full Story of this Modern Radiator
SEND FOR CATALOG "H"

Shaw-Perkins Manufacturing Company
Pittsburgh, Pa.

Corrosion Protection
IS THE SOLE PURPOSE OF



The Hickman Air Separator

Low in Cost—
Easy to Install—
Maintenance Nil—
Certainly Worth Investigating

Write for Bulletin No. 3

WESTERN ENGINEERING CO.
215 Market Street
SAN FRANCISCO CALIF.

GRADON MANUFACTURING COMPANY
Heat Exchange Equipment
Expansion Joints — Separators

ENGINEERED Gradon PRODUCTS
TRADE MARK

Engineering Dept.
Land Title Building

General Offices and Plant
East Tioga and Memphis Sts.

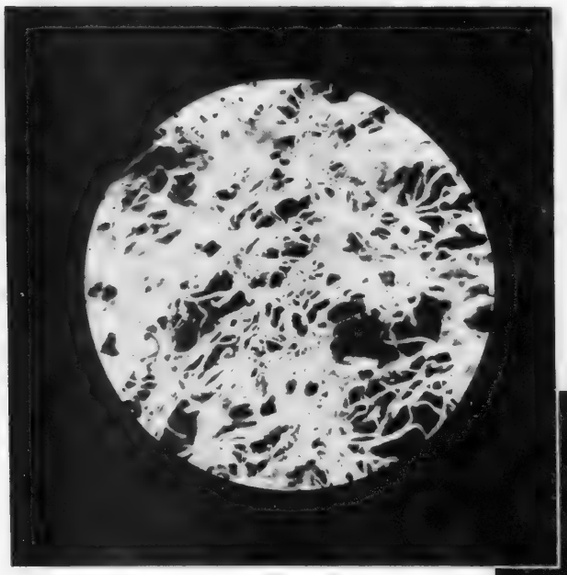
PHILADELPHIA, U. S. A.

CENTRAL STATION STEAM CO.
2912 East Woodbridge St.
DETROIT, MICHIGAN

MANUFACTURERS OF

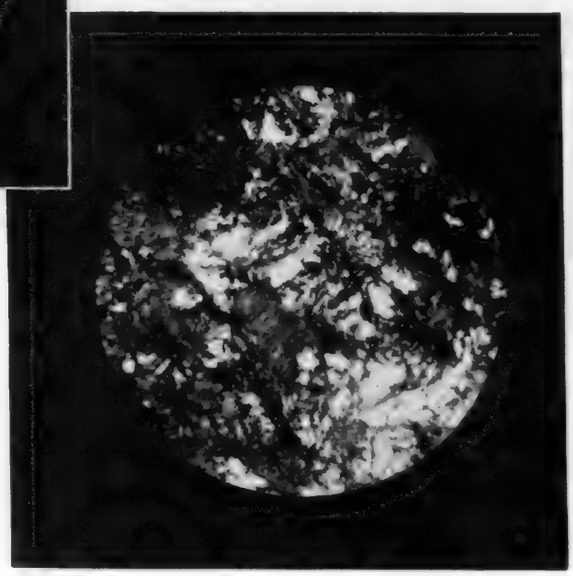
Cadillac Condensation Meters
Detroit Feed Water Meters

Packingless Expansion Joints and other special fittings for underground steam distribution mains.



At left: Single ply of clean AIRMAT magnified 15 diameters. The largest openings (indicated by the black spots) are no larger than pencil points. The overlapping of these openings in adjacent plies precludes the possibility of any direct passageways through the mat for dirt particles.

Below: Outer layer of dirty AIRMAT magnified 15 diameters. The successive plies show considerable but decreasing amounts of entrapped dirt. In this view the openings show white and the dirt particles black.



AIR *penetrates the* AIRMAT . . . DIRT *does not*

"LOST in the woods" might be a fitting title for the picture at the right. The dirt particles are literally lost in this fibrous textured filtering material derived from wood. These photo-micrographs show clearly why air goes through the AIRMAT so easily and dirt does not. That's the explanation of the high filtering efficiency of this new medium and its low air resistance.

The AIRMAT has demonstrated conclusively that it offers a standard of cleaning efficiency previously unknown in commercial air filters. Its cost is low, too. Ask for demonstration. A bulletin describing this latest National development is ready for you.

NATIONAL AIR FILTER COMPANY

5130 Ravenswood Avenue, CHICAGO

H&V5-Gray

BUHL LAND COMPANY
GRISWOLD AND CONGRESS STREETS
DETROIT

June 7, 1927

American Temperature Indicating Co.,
1017 Summit
Toledo, Ohio

Attention Mr. D. B. Noyes

Gentlemen:

Having used your Caliscope instrument in the Buhl Building for a period of two years, or through three heating seasons, I am pleased to advise that it has been the means of operating our heating system very efficiently.

We have twenty-five stations that indicate temperatures to the engineer in the basement, who in return regulates the steam pressure to supply sufficient heat and avoid overheating, which is very expensive.

I might say that with the Compound Orifice equipment installed in the heating system and the intelligence furnished by the Caliscope, we are able to maintain a uniform temperature throughout the building. This is evidenced by the charts taken by recording thermometers, as shown in the inclosed phamplet "An Experience with the Orifice Method of Steam Distribution" which was presented before the National District Heating Association on May 14, 1927.

Yours very truly,
BUHL LAND COMPANY
Operating Superintendent

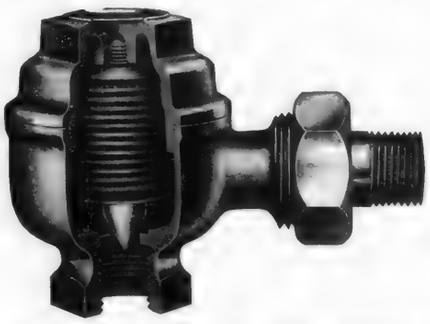
VWH:MMB

Note the above letter showing how successfully the Caliscope is being used in the Buhl Building in Detroit, Michigan.

Modern ventilation as it is understood today, necessitates accurate control of temperature and humidity and consequently requires accurate and convenient determination of same. The Caliscope makes this possible. Let us send complete information.

THE AMERICAN TEMPERATURE INDICATING CO. - TOLEDO, OHIO

THE No. 3 THERMOFLEX-HYDRON ANGLE RADIATOR TRAP



The Hydron Bellows is the only **hydraulically formed proof-tested** bellows used in thermostatic radiator traps today. Each and every bellows is subjected to several hundred pounds, internal hydraulic pressure in the making. Weak, uneven, or defective metal **will not** make a Thermoflex-Hydron Bellows. Our new complete catalog No. 52 is now ready for delivery. Gladly mailed upon request.

W. D. CASHIN COMPANY
35 Hartford Street **Boston, Mass.**

The Security Stove & Mfg. Co.
of Kansas City, Mo.
announces

The Lorne Engineering Co.
625 W. Congress Street
Detroit, Michigan

Wholesale Distributor for Michigan, U.S.A.
and
Province of Ontario, Dominion of Canada
Attractive Agency Proposition
Open to Dealers

Heating Specialists, Plumbers, Household Utilities Companies are invited to correspond and apply as above or to:

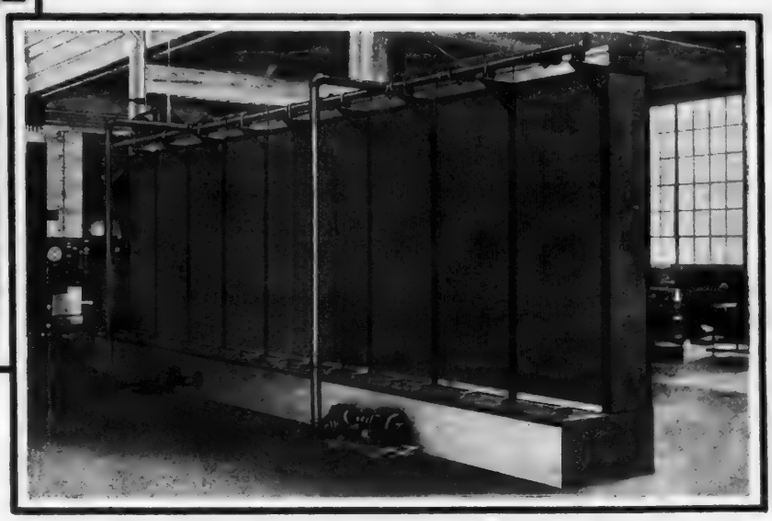
Security Stove & Mfg. Co.
1600 to 1700 Oakland Avenue
Kansas City, Mo.

SECURITY OIL & GAS BURNERS ARE
NATIONALLY USED PRODUCTS
Sold from Coast to Coast

Listed as Standard by the Underwriters' Laboratories, and bears their label. Approved by the New York City Board of Standards and Appeals.

BOTH are Reed Air Filters!

The Reed Standard Unit— the Reed Streamline Automatic



Made by the World's Largest Manufacturer of Air-Cleaning Equipment

The name Reed is accepted as a symbol of the utmost in air-cleaning practice—recognized as a leader in the field.

▼ ▼ ▼

THE REED STANDARD UNIT

Over 250,000 now in use. High cleaning efficiency assured by adhesive-coated, galvanized wire media used exclusively in Reed Unit Filters—97% to 99% guaranteed. Low operating resistance—.25" water gauge. Largest dust capacity obtained by use of smallest possible baffles and progressive packing—one of the original Reed innovations.

THE REED *Streamline* AUTOMATIC

Entirely automatic in operation. No personal attention required. Stationary filtering media. No gears, cogs, chains or sprockets. Nothing to wear out—nothing to get out of order. High cleaning efficiency—97% guaranteed. Constant, low air resistance—.30" water gauge. Made in standard-size sections for easy installation for filters of any capacity.

BOTH types of air filter shown above are *Reed* Air Filters. Both were originated by Reed engineers according to the most efficient principles of dust-removal. Both were developed to meet every possible demand in modern air-cleaning practice. Both built and tested in the Reed factory. Both in continuous and successful operation by many of the world's largest users, all installations combined representing a total capacity of over 300,000,000 cubic feet!

There are very definite reasons for the growing preference among leading architects and engineers for *Reed*. It will pay you to investigate these reasons before you buy. The coupon is for your convenience. REED AIR FILTER CO., *Incorporated;* 218 Central Ave., Louisville, Ky.

Representatives in Principal Cities

Reed Air

TRADE MARK

filters **ALL METAL**

Use This

REED AIR FILTER CO., *Incorporated*
218 Central Ave., Louisville, Kentucky

Send, without obligating me, full particulars about the Reed Automatic Air Filter ☐ The Reed Standard Unit Air Filter ☐

Name..... City..... Possible Use.....

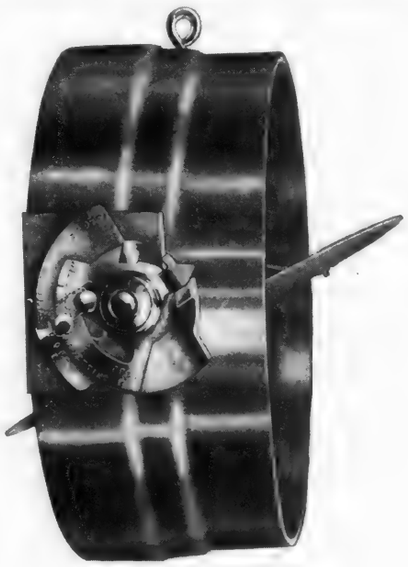
Company..... State.....

Get the $and ¢ in atifa¢tion

The Preferred 100% Automatic Damper will make more money for you and save more for your customers. It will show a saving of 10 to 25% on fuel costs. It is entirely automatic. It is easy to install.

Sell one with every oil burner—Get the extra profit and let your oil burner show your customers its greatest economy. Every oil burner in your territory that is not now equipped with the Preferred 100% Automatic Damper is a splendid prospect for added profit for you.

Listed as Standard by Underwriters Laboratories



Patents Applied For

Preferred utilities are preferred because they are practical in performance and price. They are designed and manufactured for the oil burning industry by oil burning engineers who have been in the oil burning field for years.

Preferred Utilities:

PREFERRED 100% AUTOMATIC DAMPER
PREFERRED FOOT VALVES
PREFERRED ANTI-SYPHON VALVES
PREFERRED DOUBLE TAPPED BUSHINGS
PREFERRED FLUSH BOXES
PREFERRED VENT PROTECTORS

Other Preferred Utilities are in our laboratory and on test in the field.

Exclusive Distributors for Absolute Con-Tac-Tor Corp., in New England, New York and Northern New Jersey. Complete stock carried in New York City.

PREFERRED UTILITIES MANUFACTURING CORP.

33 West 60th St., New York, N. Y.

BOOKS ON HEATING AND VENTILATION

THE DESIGN OF GRAVITY-CIRCULATION WATER HEATING SYSTEMS, by F. E. Giesecke, Ph. D. A book, remarkable for its conciseness and clearness of expression, which contains the essence of the information needed for the proper design of gravity water heating systems, based on the principle that the frictional resistance must equal the force maintaining flow. The importance of the presentation is evidenced by the fact that the entire water heating section of the A. S. H. & V. E. Compendium of Modern Practice has been discarded and replaced with a new section by Doctor Giesecke, embodying the methods here presented in detail. 64 pages of text and 10 pages of tables and charts. Price, $3.00.

PLUMBERS' HANDBOOK, by Samuel E. Dibble. This work contains valuable data for the heating engineer and estimator, architect, building contractor and sheet metal worker, as well as for the plumber. Each subject is treated by a specialist, the section on Pipe Standards and Pipe Dies by F. N. Speller and that on Heating by Alphonse A. Adler. Size 4 x 7 in. 629 pp. 316 ills. Cloth, $4.00.

HOUSE HEATING WITH OIL FUEL, by P. E. Fansler, Associate Editor of The Heating and Ventilating Magazine. Prepared for the use of heating and ventilating engineers, heating contractors and those engaged in the oil-burner industry. One of the outstanding features of the book is the presentation of the subject of oil combustion. Over a dozen beautiful and spectacular flame photographs were made particularly for this book in order that the subject of oil combustion might more thoroughly be presented. Three chapters are devoted entirely to the discussion of salient points of the outstanding oil burners that are on the market to-day. The chapter, "Oil Burners Listed by the Underwriters," is the only authentic, chronological list of oil burners that has been listed by the Underwriters in the past. 32 chapters totaling 362 pages and more than 150 illustrations. Size 7 x 10. Price, $4.00 postpaid.

HEATING AND VENTILATION, by the late John R. Allen and J. H. Walker. This is the second edition of this work and has been brought up to date in every particular, including the latest radiator transmission factors put out by the Research Laboratory of the A. S. H. & V. E. and the Hill synthetic air chart testing method. Especially adapted for use as a text book. Size 6 x 9 in. 322 pages Cloth, $3.50.

A. S. H. & V. E. GUIDE, 1928, sixth edition, with previous sections revised and brought up to date. Includes new tables covering heat transmission from building construction, and comprehensive tables for figuring pipe sizes for gravity, vapor, and vacuum steam heating systems, based upon A.S.H. & V.E. Research Laboratory tests on one and two-pipe steam riser capacities. Size 6 x 9 in. 680 pp. and list of A.S.H. & V.E. members. Cloth $4.00.

DESIGNING, HEATING, AND VENTILATING SYSTEM, by Charles A. Fuller. A treatise on the practical application of the engineering rules and formulas in every day use, in laying out steam, hot water, furnace and ventilating equipment for buildings of all kinds, presented in a simple manner. Price $3.00.

HEATING AND VENTILATION, by Charles W. Brabbée. This is the first American edition of the famous Heizungs-und Luftungstechnik, by Dr. H. Rietschel, and C. W. Brabbée, translated from the seventh German edition, edited and revised to make it adaptable to conditions in the United States. Supplemented by 7 charts covering steam and water heating and ventilation. Size 6 x 9 in. 332 pp. cloth $4.50.

PRACTICAL STEAM, HOT WATER HEATING AND VENTILATION, by Alfred G. King. Containing 396 illustrations. The book is a working manual for heating contractors, journeymen, steamfitters, architects and builders. Describes various systems of heating and ventilation and includes useful data and tables for estimating, installing and testing such systems. 8 vo. 367 pages. Price $4.00.

MECHANICS OF HEATING AND VENTILATING, by Konrad Meier. Including a series of ten charts containing data relating to the flow of water, steam and air, collected by Mr. Meier during an experience of 26 years in heating and ventilating work, both in this country and abroad. Each of the charts replaces a series of tables on the subject, giving at a glance the results of a calculation from any combination of factors. 161 pages, illustrated, with ten large charts. Size 6 x 9 in. Price, $5.00. Separate sets of charts printed on cloth, with lines in different colors and mounted on boards. Single charts, $1.50. Sets of ten, $15.00.

HANDBOOK FOR HEATING AND VENTILATING ENGINEERS, by James D. Hoffman. Fourth edition of this important work entirely rewritten and reset. A standard manual covering theory and practice, with special chapters on heat losses, furnace heating, water and steam heating, mechanical vacuum heating, mechanical warm-air heating, temperature control, electrical heating and refrigeration. With appendix of 75 tables. Size 4½ x 6¾ in. Pp. 478. Price $4.50 postpaid.

HANDBOOK OF THE NATIONAL DISTRICT HEATING ASSOCIATION. Devoted to data on all phases of central station heating work, including generation, distribution, utilization, meters and water heating, compiled by the Association's Educational Committee. All new and revised data for this book will be supplied free for five years. Bound in leather, with six-ring binder. Price $5.00, postpaid.

THE HEATING and VENTILATING MAGAZINE
386 FOURTH AVE., NEW YORK

Porter's

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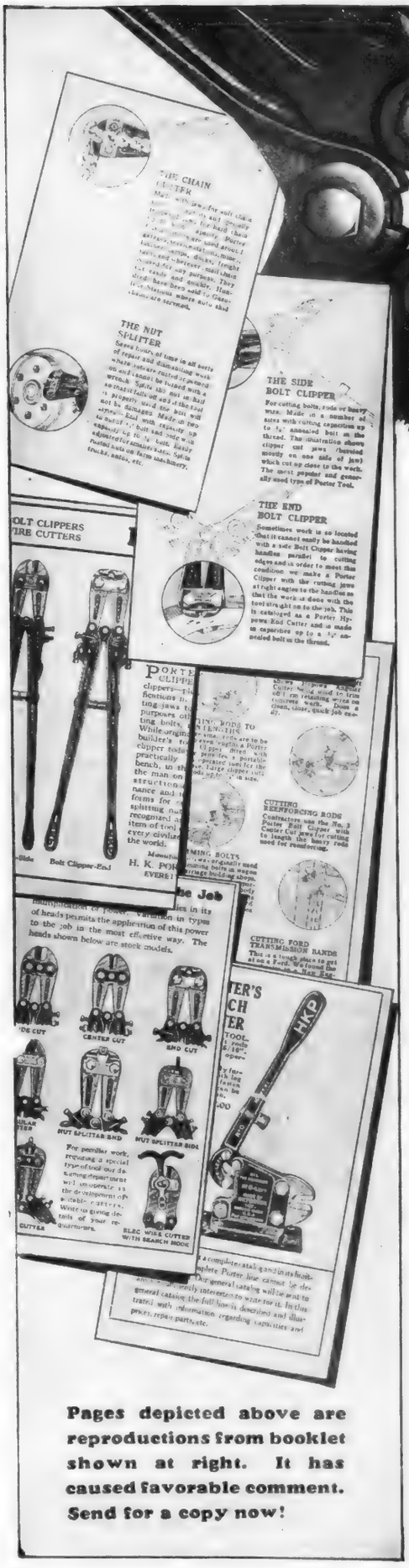

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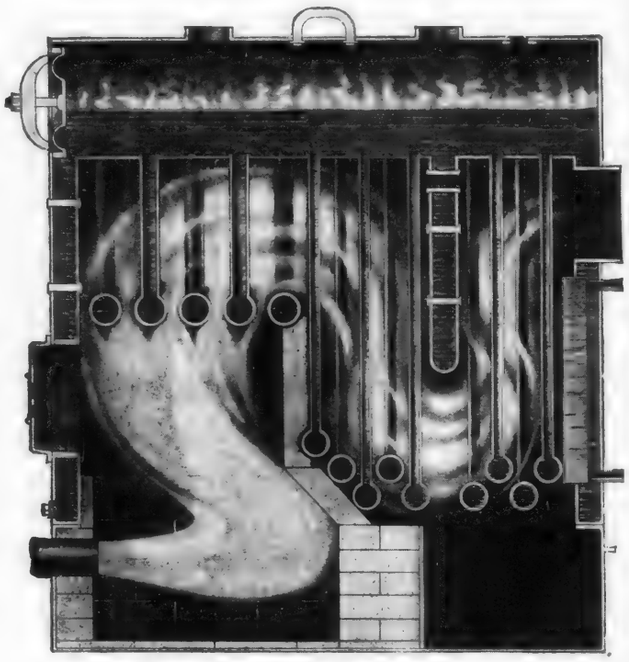

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That is the function of the modern heating plant.

To accomplish that successfully is a big job. You cannot ask the boiler to perform numerous other tasks and still heat the home at maximum efficiency.

The purpose of the heating boiler should be, to heat the home and do that one thing well.

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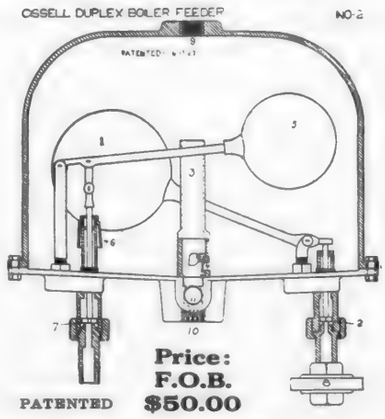

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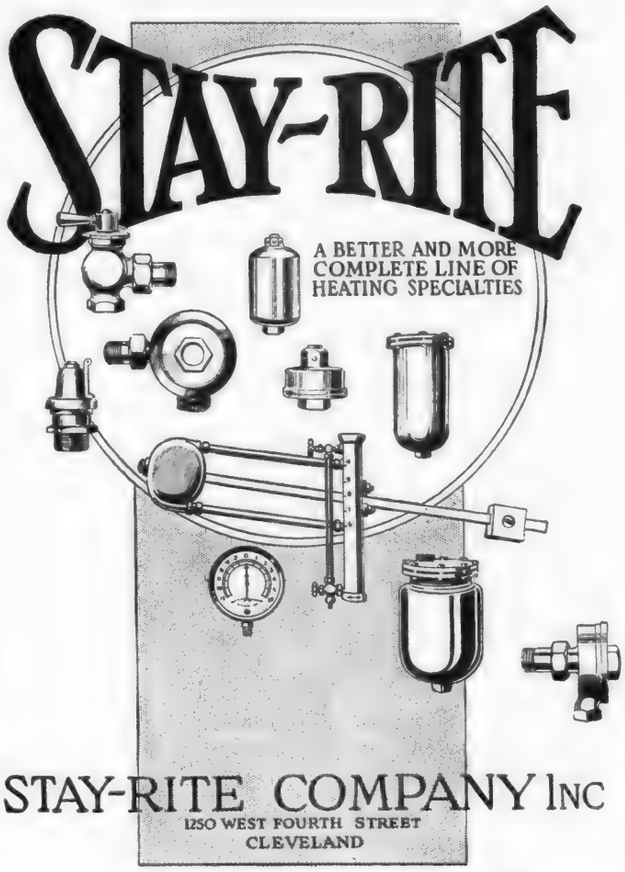

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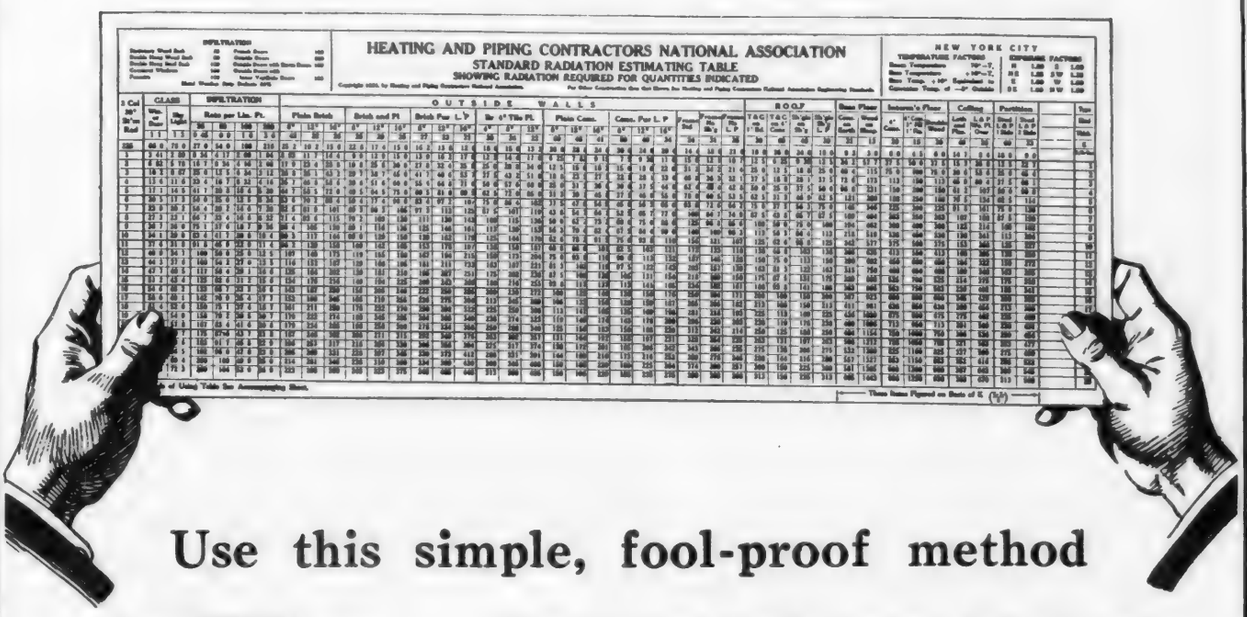
The successful heating contractor knows most about RADIATION


HEATING AND PIPING CONTRACTORS NATIONAL ASSOCIATION
STANDARD RADIATION ESTIMATING TABLE
SHOWING RADIATION REQUIRED FOR QUANTITIES INDICATED
NEW YORK CITY

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The Heating and Piping Contractors National Ass'n

—has adopted this Certified Heating Insignia as a mark of quality heating. The Insignia on a heating estimate indicates that the contractor is a member of the National Association and will install the proposed heating plant in accordance with the standards of Certified Heating.

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Standard Radiation Estimating Tables for the 31 cities listed below are available in addition to this comprehensive book:

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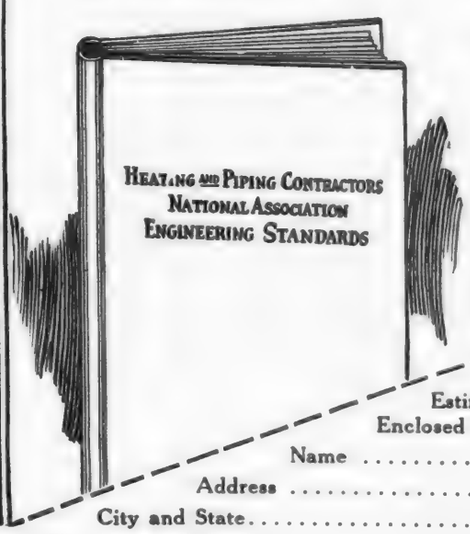

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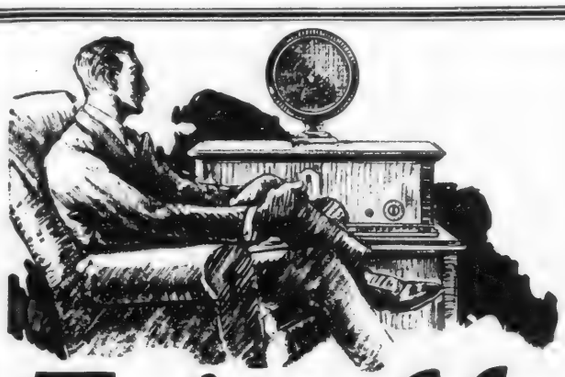

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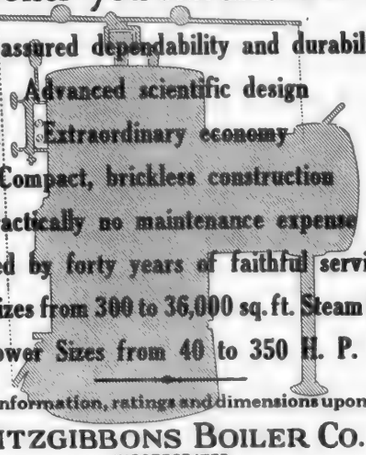

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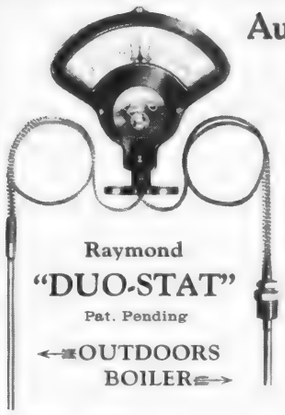

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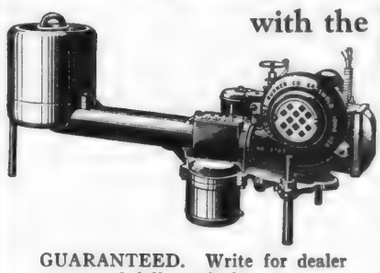

If you're planning a real oil burner business for 1928 you'll want to line up *now* with the LACO. Made in five sizes—meets all price competition and is second to none in economy of operation and freedom from bothersome service calls.

GUARANTEED. Write for dealer terms and full particulars.

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House Heating with Oil Fuel

By P. E. FANSLER

Associate Editor, The Heating and Ventilating Magazine

THIS publication has been prepared for the use of the heating and ventilating engineer, the heating contractor, those engaged in the oil-burning industry, and the user and potential user of oil-burning equipment. Over a dozen beautiful and spectacular flame photographs were made particularly for this book in order that the subject of oil combustion might be more thoroughly presented.

Three chapters are devoted entirely to a discussion of the salient points of the outstanding oil burners that are on the market today. The chapter on efficiency clears up a great many points that are hazy in many minds. The chapter, "How Many Gallons of Oil Equal a Ton of Coal," and the chapter, "Checking the Radiation," will be of great value to those engaged in the sale or engineering phases of the industry.

I. The Era of Automatic Control.
II. The Use of Liquid Fuels for House Heating
III. Oil Fuels—Definitions, Characteristics and Specifications.
IV. Oil Fuels—Source, Preparation and Distribution.
V. Combustion—Theory.
VI. Combustion—Practical Considerations.
VII. Boilers for Use with Oil Burners.
VIII. Boilers Particularly Adapted to Oil Burning.
IX. Warm-Air Furnaces for Use with Oil Burners.
X. Oil Burners—Types—Characteristics.
XI. Oil Burners—Atmospheric.
XII. Oil Burners—Mechanical Draft.
XIII. Oil Burners—Mechanical Draft.
XIV. The Control of Oil Burners.
XV. Accessories.
XVI. Tanks and Storage.
XVII. Efficiencies.
XVIII. Iso-Degree-Day Chart—Iso-Oil-Consumption Chart.
XIX. The Value of House Insulation.
XX. Selling Oil Burners.
XXI. How Many Gallons of Oil Equal a Ton of Coal?
XXII. Checking the Radiation.
XXIII. Checking the Heating-Plant Installation.
XXIV. Installing the Oil Burner.
XXV. The Underwriters' Regulations.
XXVI. Heating Service—Servicing Oil Burners.
XXVII. Buying an Oil Burner.
XXVIII. What the Underwriters' Listing Means.
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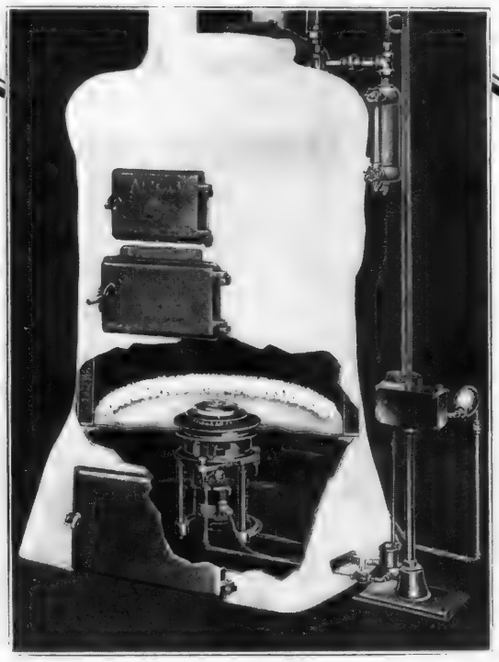

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Using heating principles tested and found true over a period of ten years, the new Noiseless Nokol is designed as the final perfection in automatic oil heat, and offered at a price which will immediately increase sales for dealers.

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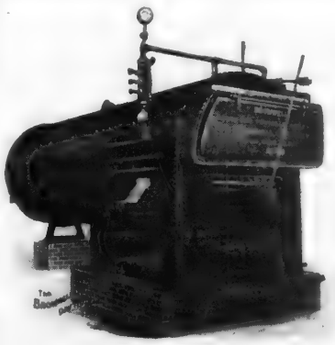

Brownells conform to ASME and all special state boiler laws.

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The Brownell line of boilers is very complete—contains several types of riveted steel boilers in varying sizes, particularly adaptable to heating requirements.

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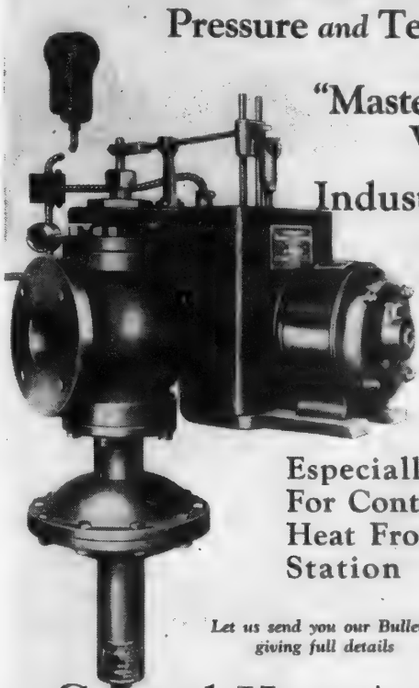

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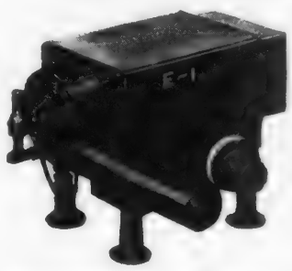

RADIATION—100 to 1000 Ft.

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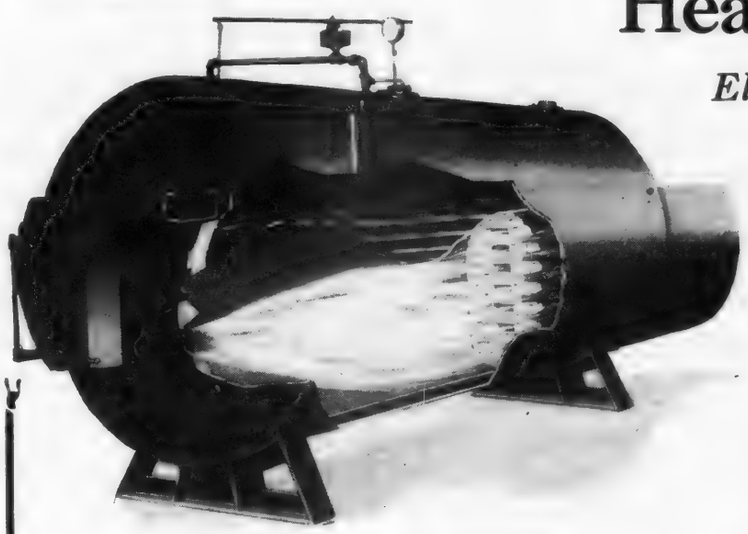

Our fifty years' experience and large facilities have been combined to make this Heating Boiler an outstanding improvement in its line. It combines the finest known types of A.S.M.E. construction and materials. Large combustion space, big water capacity and ample steam space give it the highest degree of efficiency and economy. It is smokeless and the rating is guaranteed. The rapid circulation of the water caused by the circulating tube makes the Racine Heating Boiler ideal for hot water as well as steam. It requires low head room and is the easiest boiler to install and to clean. Boiler is a complete unit when shipped from factory—no brick work to be installed by heating contractor.

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By **P. E. FANSLER,** *Associate Editor, The Heating and Ventilating Magazine*

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"I have just returned from a trip on the road and find copy of "House Heating With Oil Fuel" which I requested you to mail me here, and I herewith enclose order in payment of same. I have bought all available books published on oil burning during past seven years I have been connected with development work in the field, appointing dealers for oil burners, and there has been nothing yet that approaches this book. Every oil-burner dealer owes it to himself to have a copy. I will advise all of our dealers to get a copy of this book as an absolute essential."

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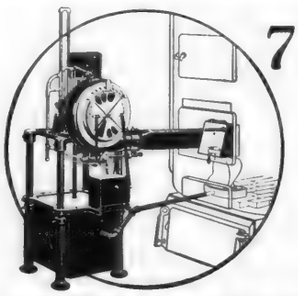

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Oil or gas combustion is rapid—a flash of intense heat. To be efficient a boiler must turn this heat into steam almost instantly. For this reason the water in a Bryan Boiler is carried directly in the path of heat, encased in copper tubes, which are highly conducive of heat. There are no thick walls of cast iron to absorb the heat and retard steaming. These tubes are at right angles to the heat travel and turn every available unit of heat into steam.

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But economy isn't all—CONVENIENCE AND RELIABILITY play a big part in Bryan recommending qualities. A Bryan domestic boiler maintains an even, regulated temperature in every room of the home. You can *depend* on a Bryan. It always works perfectly. Satisfied users everywhere testify to Bryan superiority.

Exclusive sales franchises are granted to the heating trade in open territory.

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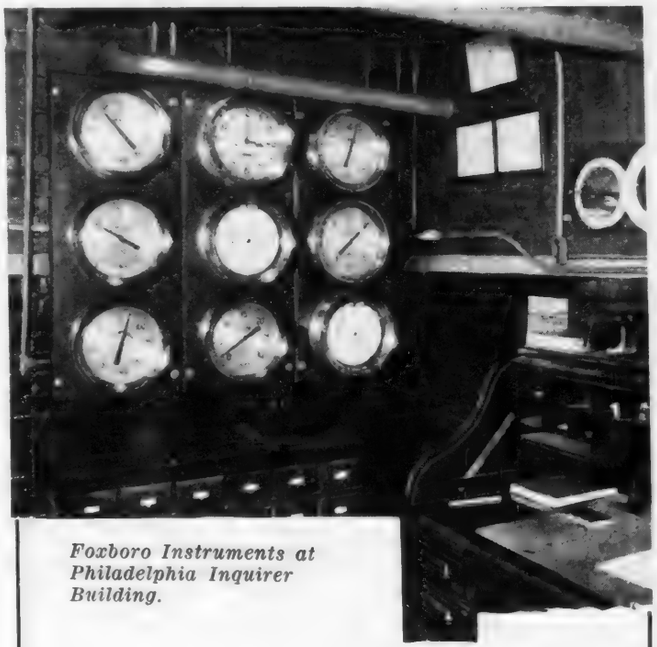
PERU (Boiler Division, 402 Bryan Bldg.) **IND.**



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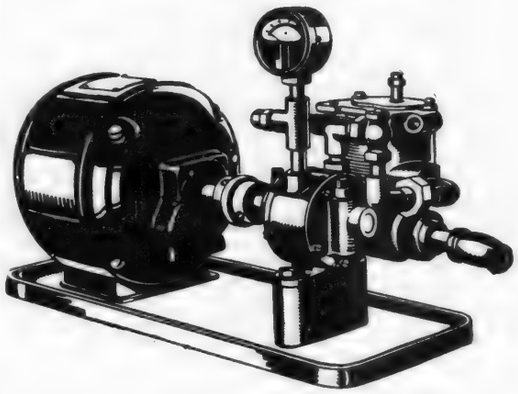

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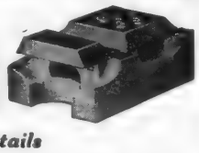
Pyramid Grates Do It

Owners of buildings of all types have cut their coal bills radically by using Buckwheat Coal.



You can burn Buckwheat with PYRAMID GRATES

Let Us Send Full Details

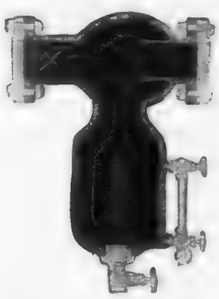
PYRAMID IRON PRODUCTS CO.
230 East 41st Street New York City

SWARTWOUT
Steam Products

Swartwout Air Separator
Either cast iron or cast steel.
99% Dry Steam Guaranteed

Swartwout Cast Iron Exhaust Head
Built to last a lifetime

Swartwout Low Pressure Float Trap
Large Capacity—Self-Cleaning Valve



Swartwout Steam Separator
Separation by the centrifugal principle

Swartwout Bucket Type Steam Trap
Intermittent action—pressures to 250 lbs. Trouble-Free.

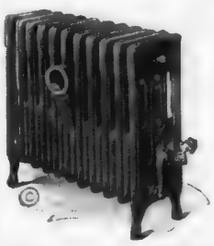
The products illustrated are only a part of the Swartwout line. We would like to give you full information on Swartwout Traps, Separators, Exhaust Heads and Strainers.

THE SWARTWOUT CO.
General Offices: **18525 Euclid Ave., Cleveland, Ohio**
Factories: **Cleveland and Orrville, Ohio**

Cleve Company Filling Stations, Carnegie & East 35th Street, Cleveland, Ohio. Gasteam Equipped

Faneuil Hall Markets Boston, Mass. Gasteam Equipped

"Everywhere" You Look— There's Heating Business for You with Clow Gasteam Radiators



Here are just a few of the "everyday" Gasteam jobs; a gas station, the huge Boston Produce Market, a beautiful home, a small cigar store.

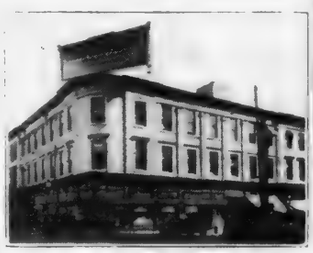
And there are hundreds of other types of heating jobs that are equipped with Clow Gasteam. Every heating man should look around his district. There's heating business to be found almost "everywhere."

Here's a tip: switchmen's and bridge tenders' towers, "owl" lunch rooms, contractors' shacks. They are some of the more unusual jobs.

Each Clow Gasteam Radiator is an independent steam heating plant, using gas for fuel. Unvented, they provide moist heat (necessary in dry climates). Vented—the products of combustion are carried off, and a dry heat is provided.

Send for our free catalog illustrating the wide use of these practical Gasteam Radiators.

Home of C. R. Minor, Shreveport, La. Edward F. Neild, Architect Gasteam Equipped

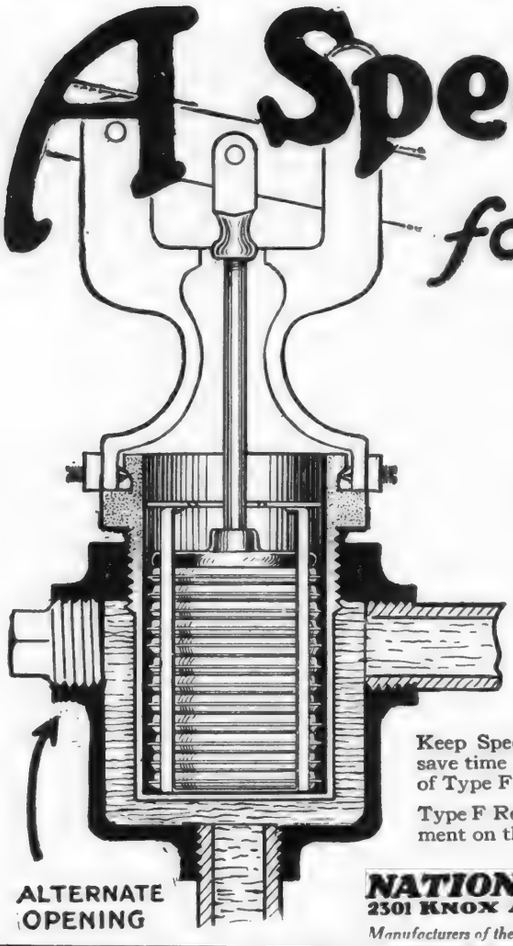


Liggett Building, Jacksonville, Fla. Gasteam Equipped

JAMES B. CLOW & SONS
201-299 No. Talman Avenue, CHICAGO

CLOW GASTEAM

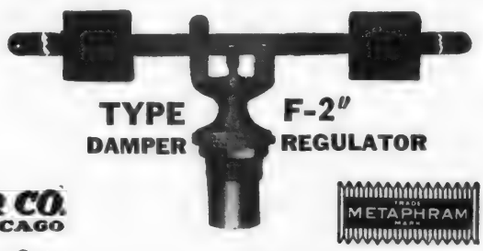
A Special Fitting for Type F DAMPER REGULATOR



Used where no 2″ opening in boiler is available. The Special Fitting for Type F (shown in black) takes the place of a "Y" fitting, greatly simplifying installation. Has three threaded openings, the two best suited being used and the third plugged, making it adaptable to any location.

Keep Special Fittings in stock; they save time on all pipe line installations of Type F Damper Regulators.

Type F Regulators are standard equipment on the better boilers.



METAPHRAM

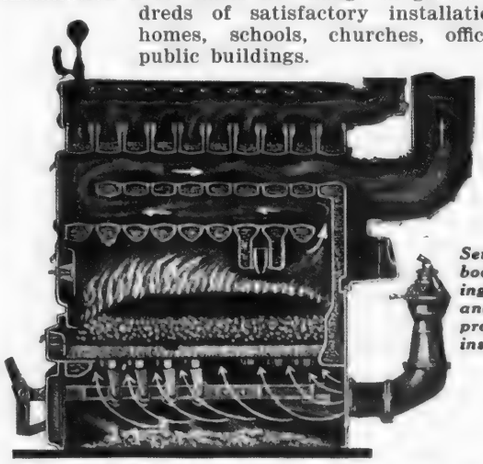
NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO
Manufacturers of the National System of Automatic Temperature Control

MORE HEAT PER TON OF COAL

WITH THE COPPUS (REGISTERED U.S. PAT. OFFICE)

UNDER-GRATE DRAFT BLOWER

The COPPUS is a scientifically constructed, coal burning blower designed to burn any grade of coal. Its installation necessitates no change in grates. Hundreds of satisfactory installations in homes, schools, churches, office and public buildings.



Send for booklet, giving details and list of prominent installations

INTERNATIONAL FUEL SERVICE CORP.
Sole Distributors in the United States and Canada
BRIDGEPORT, CONN.

New Home Study Course in Gravity Steam and Water Heating

The New Home Study Course in Gravity Steam and Water Heating which has been one of the most popular features in THE HEATING AND VENTILATING MAGAZINE during the past two years is now ready in loose-leaf form (without instruction features) for the astonishingly low price of

$10 00 —plus $1.35 apiece for two special binders to hold the course

Never before offered in reprinted form except to purchasers of the correspondence course which sells for $120.00. Send for full details.

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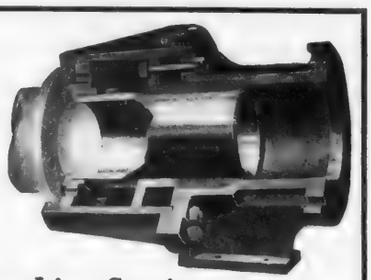
386 Fourth Ave. NEW YORK

HOWARD Guided Expansion Joint



For Pipe Line Service

Eliminates trouble from Expansion and Contraction, saves space, labor and repair bills; the construction is mechanically correct.

ALBERGER HEATER CO. 285 Chicago St.
HOWARD IRON WORKS Buffalo, N. Y.

The Choice of 19,000 Men

Above all the evidence we might offer to prove the superiority of Sarco Radiator Traps and Packless Inlet Valves, there looms the one doubt-paralyzing fact that 19,000 men have bought the Sarco.

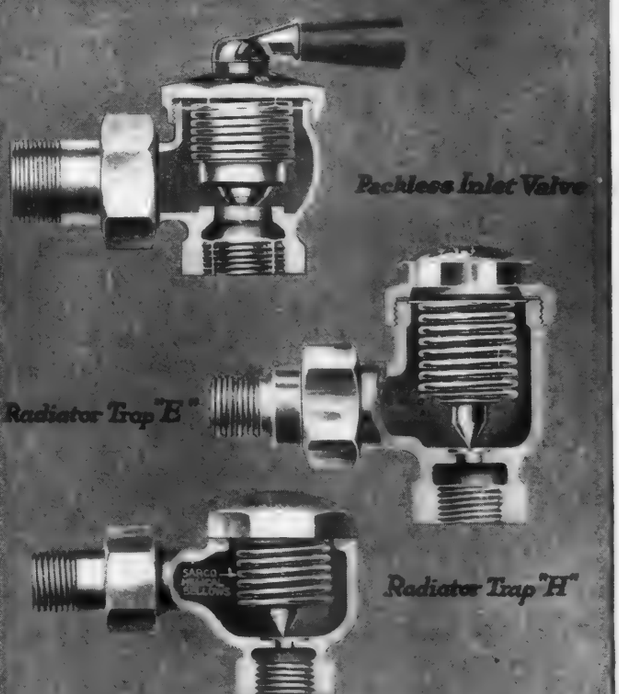
If you waive aside the claims we have made about the Sarco, you discount the sagacity and the shrewdness of these 19,000 men who have built solid successes in business with the same keen judgment that prompted them to buy Sarco Traps and Valves.

In the face of indisputable evidence like this, isn't it at least worth while for you to find out more about Sarco Traps and Valves? Why not write, while you think of it, for a copy of our Booklets P-304 and P-155.

SARCO CO., Inc.

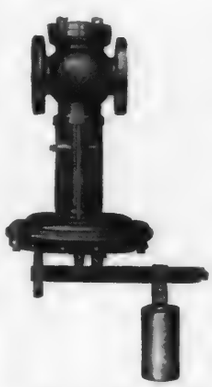
183 Madison Ave., New York, N. Y.

Boston Cleveland Pittsburgh
Buffalo Detroit St. Louis
Chicago Philadelphia
Peacock Bros., Ltd., Montreal



SARCO

Famous from coast to coast



Mason No. 236
Lever Style
Reducing Valve

Parker House Rolls with their rich, tender, butter-crust have given a national reputation to the hotel whose name they bear.

Last year, Boston saw a new and modern Parker House rise on the site of the old one ... Mason Regulators formed an important part of the pressure control equipment.

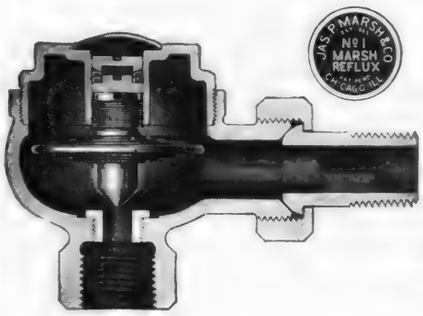
The steadily increasing list of prominent buildings equipped with Mason Regulators is proof that you will find it profitable to include them in the contracts you are now figuring. Write for a copy of Catalog No. 62.

Mason Regulators

MASON REGULATOR CO.
Boston, Mass.

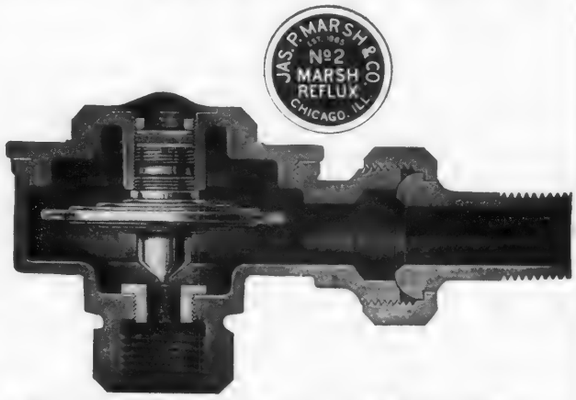
1871

MARSH REFLUX THERMOSTATIC RADIATOR TRAPS



GUARANTEE ON EVERY TRAP

If any Marsh Reflux Trap might develop a defect in material, workmanship or operation inside of five years after date of installation, such Trap would be replaced free of charge.



The Most Economical, Practical and Efficient Trap for the Average Sized Unit

Marsh Reflux Traps assure full efficiency of Radiator Coil and System.

Automatically discharge air and the water of condensation as fast as it is formed.

The Trap closes the instant steam or vapor strikes the thermostatic diaphragm. Vapor or steam cannot pass through the Trap; therefore every atom of heat is given off in the radiator or coil.

Just one movable part—nothing loose to rattle, chatter or make a noise.

Neat in appearance, handsomely finished and heavily nickel-plated.

The Economical, Practical and Efficient Trap for Both Small and Large Units

Marsh Reflux Traps are all-metal construction including heavy cast brass body, handsomely nickel-plated and with extra heavy special tail piece.

The one movable part—a genuine phosphor bronze non-collapsible Thermostatic Diaphragm—contains the combination of volatile fluids so balanced as to, at all times, distinguish between air and water of condensation and vapor or steam. So corrugated and constructed to eliminate the slightest possibility of rupture from alternate expansion and contraction.

JAS P. MARSH & CO.

114-124 So. Clinton St. Chicago

ESTABLISHED 1865

62 YEARS CONTINUOUS EXPERIENCE IN MANUFACTURE OF STEAM SPECIALTIES

Manufacturers of Radiator Traps and Specialties—Automatic Air Valves and Vents—Indicating and Recording Gauges

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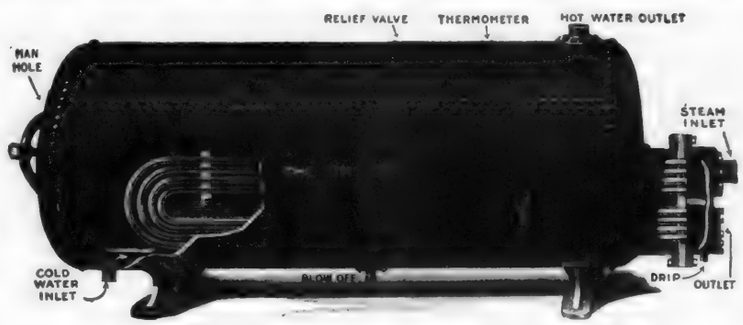


"We keep others in Hot Water"

SIMS

Storage type water heaters are furnished with "U" tubes as illustrated, or with straight tubes and floating head, as may be desired or specified.

SIMS

Water tube heaters and Converters are also constructed with either straight or "U" tubes.

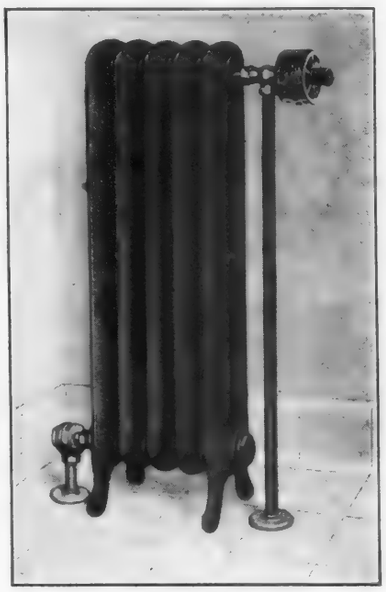
All heaters are produced complete in our plant. They are not an assembly of parts built by others.

THE SIMS COMPANY, P. O. Box 700 Erie, Penna.

Sterlco
TRADE MARK

ROYS THERMOTROL

"LET THEM REGULATE their Own Temperature"



Installed as Easily as an Ordinary Radiator Valve

OWNERS and BUILDERS! Put an end to heat complaints from tenants. Some require more heat than others. Satisfy them all by installing Sterlco Roys Thermostatic Temperature Regulators directly to the radiators and let them regulate their own temperature. A turn of the knob marked HOT, NORMAL and COLD regulates the temperature to any individual requirement.

Self-Contained Thermostatic Temperature Regulator

This device is not operated by compressed air or electrical connections, but is directly connected to the radiator. It is actuated by the temperature of the air that surrounds it and can be regulated to govern the temperature of the room.

Write for descriptive booklet No. 40

Sterling Engineering Company

1640 Holton Street Milwaukee, Wis.

GAUGE BOARDS

American Gauge Board in Ohio Bell Telephone Bldg., Cleveland, O.

Architects and Engineers, Hubbel & Benes, Cleveland
Heating Contractors, Smith & Oby, Cleveland

American Gauges, Recording Gauges, Dial Thermometers, Recording Thermometers and Clocks are furnished in the same case for uniformity of appearance, either for wall or flush mounting. They make ideal gauge board installations.

Write for the following Catalogs:

Gauge Catalog A-14,
Recording Gauge Catalog E-14,
Gauge Tester Catalog D-14,
Relief and Pop Valve Catalog V-14,
Thermometer Catalog F-14,
Dial Thermometer Catalog G-14,
Recording Thermometer Catalog H-14,
Temperature Controller Catalog R-14.

AMERICAN INSTRUMENTS

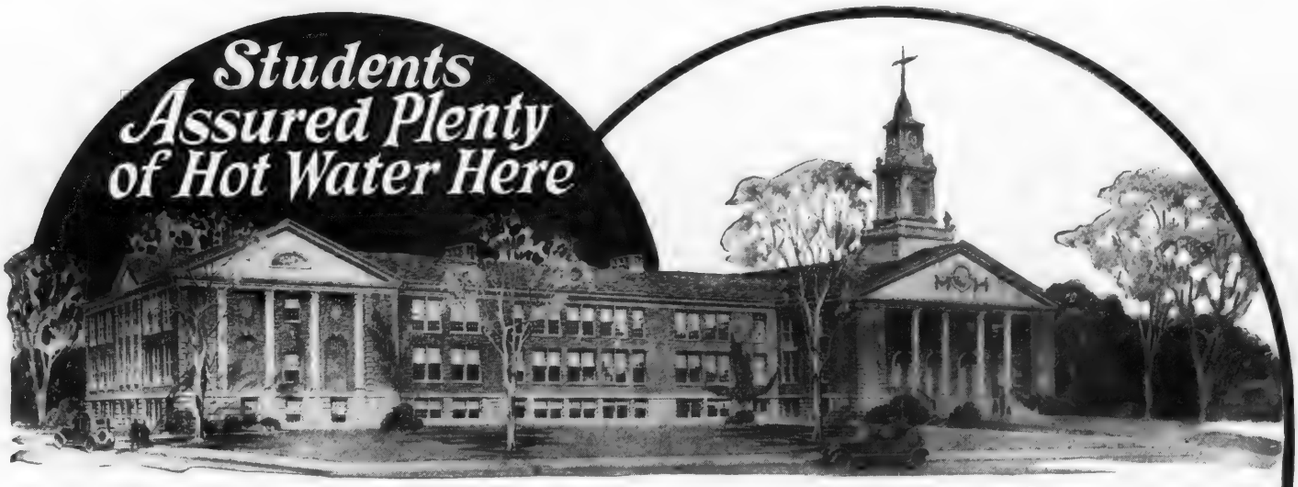
American Schaeffer & Budenberg Corporation

338 Berry St., Brooklyn, N. Y.

Branches in Principal Cities

Makers of American Industrial Instruments since 1851.

Students Assured Plenty of Hot Water Here



Northside High School, Corning, N. Y.—Palmer Rogers, Architect, Frank T. Lawrence, Inc., Plumbing Contractor

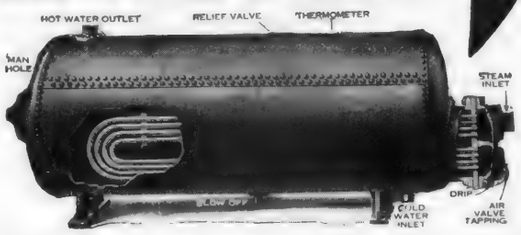
The names of about 1000 schools and colleges which are equipped with Patterson Hot Water Heaters are given in our booklet "Educational Institutions," which will be sent on request.

There are thousands of public institutions which rely on Patterson Hot Water Heaters to serve them with all the hot water required, as hot as required and as quickly as required. And the Patterson never lays down on the job.

In fact, Patterson Heaters *must* make good, because of our iron-bound guarantee which has back of it a financially responsible concern that has a 47-year reputation at stake.

Whether you require heaters for large or small buildings, for home or abroad, you will find a Patterson Heater exactly suited to your requirements. Ask for our catalog and list of installations.

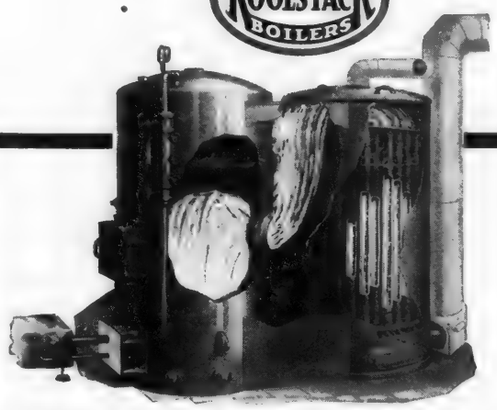
Patterson Hot Water Heaters



THE PATTERSON-KELLEY CO.

107 East 40th St. NEW YORK, N. Y.

Leader KOOLSTACK BOILERS



KOOLSTACK BOILERS *for* Oil Burning

Will also burn Coke or Anthracite Coal.

Why Burn 35% to 50% More Fuel?

Write for Koolstack Boiler Catalog.

LEADER IRON WORKS

2150 N. Jasper St., DECATUR, ILL.

Eastern Office and Warehouse, 21 E. 40th St., New York, N. Y.

ROSS Crosshead-GUIDED Expansion Joint Excels in

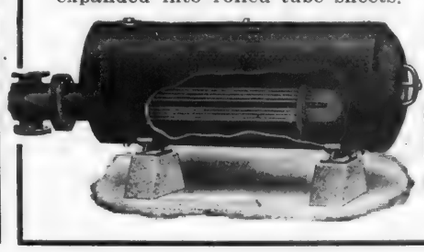
Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer

ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.

New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.

O. E. F. Storage Heaters give Dependable Service

These heaters are made in the U-tube and straight tube types; steel of flange quality used throughout. The heavy gauge seamless drawn copper tubes are expanded into rolled tube sheets.



Tanks and parts for all sizes carried in stock. Write us for further details.

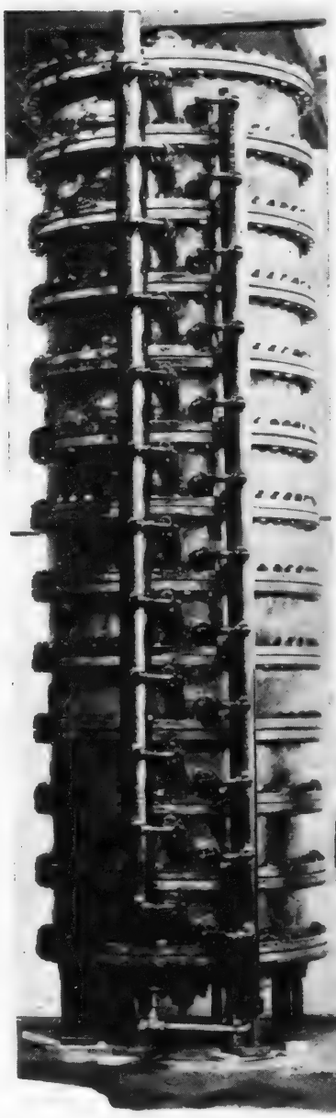
O. E. FRANK HEATER & ENGINEERING CO., Inc.

Factory and Offices at Buffalo, N. Y.

NATIONAL
Fuel Oil Heater

Illustrated here is a Fuel Oil Heater of exclusive National design. There are many National heaters similar to this one now being used in large central stations and industrial plants for heating fuel oil.

A wealth of experience on big installations of difficult nature over the past 43 years, better equip us to design and build oil or water heaters of any size or type.



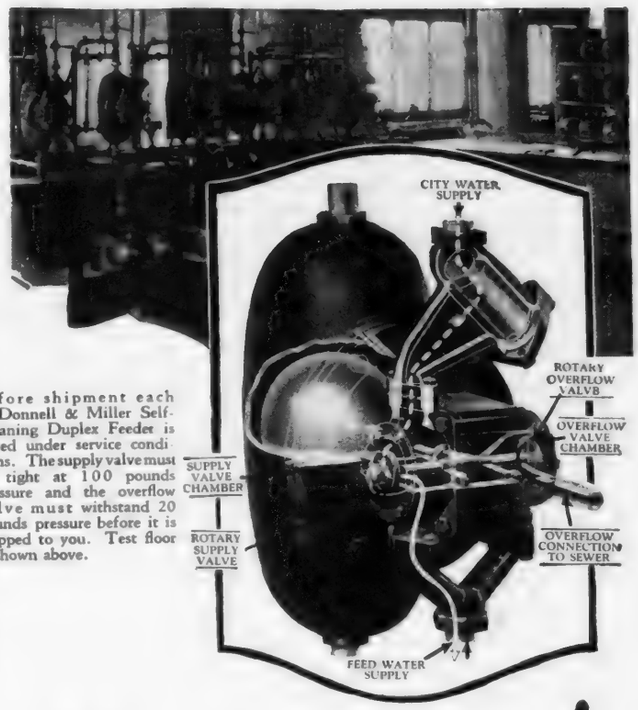
We are ready to handle your particular problem, guaranteeing complete satisfaction with the finished product. Let us quote you on installations of

Feed Water Heaters
Oil Heaters or Coolers
Air Coolers
Evaporators

Write for a National engineer to call and go over the job with you. We will send a bulletin describing National Heaters on request.

Note the size and rugged construction of this National Fuel Oil Heater. It is built to last a lifetime.

THE NATIONAL PIPE BENDING CO.
Established 1883
120 River St., NEW HAVEN, CONN.
BOSTON NEW YORK PHILADELPHIA



Before shipment each McDonnell & Miller Self-Cleaning Duplex Feeder is tested under service conditions. The supply valve must be tight at 100 pounds pressure and the overflow valve must withstand 20 pounds pressure before it is shipped to you. Test floor is shown above.

No tolerance!

A duplex-feeder is installed for just one purpose—to keep the boiler water line where it belongs under all conditions *always*. Other devices are satisfactory if they work right *most* of the time. But a duplex-feeder would be a failure if it failed *once!*

It is this simple fact that led to the long experiment and intensive research which has resulted in revolutionizing the Duplex-Feeder. The new McDonnell & Miller Self-Cleaning Duplex Feeder is built to work right under *any* conceivable condition of feed water and to have ample capacity to supply the entire requirements of any heating boiler.

The valves in this advanced feeder are self-grinding and self-cleaning—they *stay new*. Hard water is, therefore, no longer a hazard. Parts are fewer and more finely made. They oscillate instead of slide. Where there are no sliding parts, there can be no sticking parts. Characteristic of the care given to every manufacturing operation is the final test of each feeder as illustrated above. Throughout, the McDonnell & Miller Self-Cleaning Feeder is a "no tolerance" feeder.

New booklet for the asking

You will be interested in the advanced construction and ingenious design of this new feeder as clearly described and illustrated in the new booklet. Use the coupon to request your copy.

McDONNELL & MILLER
SELF-CLEANING
Duplex Feeder
"Doing one thing well"

McDONNELL & MILLER
710 Wrigley Building, Chicago

Please send a copy of your new booklet to

Name.....

Address.....

Business.....

UTILITY, TOO!

A Donald Douglass aquatint study of the PENNSYLVANIA POWER and LIGHT COMPANY BUILDING, Allentown, Pa. Architects, Helmle & Corbett, New York, N. Y.; Consulting Engineer, Clyde R. Place, New York, N. Y.; Heating Contractors, Riggs-Distler, Baltimore, Md.; Plumbing Contractors, John MacMillan, New York, N. Y.; General Contractors, Hegeman and Harris Company, New York, N. Y.

BEAUTY and utility are happily blended in this new 23-story building, erected for the Pennsylvania Power and Light Company, at Allentown, Pa. Care was exercised in choosing the equipment. Utility was the keynote; "Jenkins throughout" was the logical choice for plumbing, heating, fire protection and boiler room work.

Every Jenkins Valve is built for long utility, yet is of pleasing appearance—in keeping with buildings of distinction. Among the Jenkins Valves installed in the Pennsylvania Power and Light Buiding are the New Low Bonnet Radiator Valves, designed to meet the need brought about by the modern trend toward compactness in radiator equipment.

To make sure of Jenkins service, may we suggest that specifications call for "Jenkins Valves marked with the diamond and signature"?

Fig. 853 Low Bonnet Angle Radiator Valve, male union

JENKINS BROS.

80 White Street.....New York, N. Y.
524 Atlantic Avenue.....Boston, Mass.
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646 Washington Boulevard....Chicago, Ill.

JENKINS BROS., Limited
Montreal, Canada.....London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

STORAGE WATER HEATER

Announcing—

A new educational bulletin on waste heat reclamation is just off the press. A complete summary of the sources of waste heat, the savings possible and complete tables for figuring size of generators are among the worthwhile data contained.

Engineers who have seen this bulletin tell us it gives a complete summary of the much discussed waste heat reclamation problem.

Many of the largest marine and industrial concerns have successfully installed Paracoil Waste Heat saving units. You will be interested in the results they have obtained.

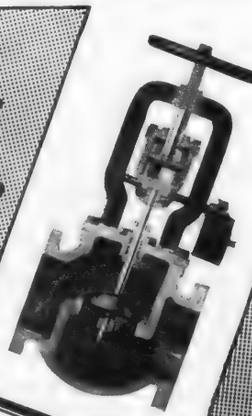
Write for the new bulletin. No obligation incurred.

DAVIS ENGINEERING CORP.
90 West St., :: New York, N. Y.

Paracoil

INDIRECT METHOD
Storage Water Heater

Steam can't back up through this valve



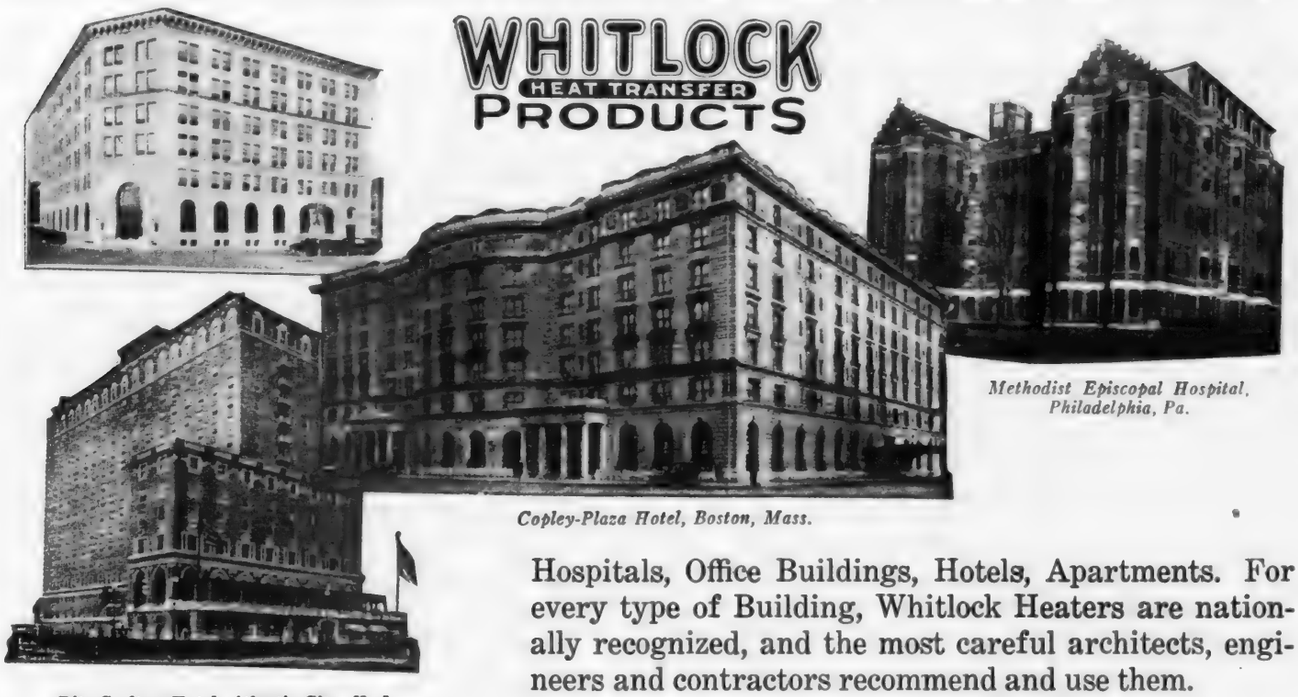
YOU are certain of a one way steam flow when Davis Stop and Check Valves protect the boilers. The serious accidents so frequently caused by a reverse steam flow when one of the boilers on the line lets down are positively prevented by this Automatic Davis Valve. Absolutely reliable in operation, it permits steam to flow from the boiler to the header, but closes instantly should the flow be reversed. The action is visible and may be hand tested quickly and conveniently.

It is simplicity of construction and design that has won Davis Valve Specialties a reputation for dependable service. Get the details in the Catalog.

G. M. DAVIS REGULATOR CO.
436 Milwaukee Avenue, Chicago, Illinois

H&V5-Gray

WHITLOCK
HEAT TRANSFER
PRODUCTS



Methodist Episcopal Hospital, Philadelphia, Pa.

Copley-Plaza Hotel, Boston, Mass.

Ritz-Carlton Hotel, Atlantic City, N. J.
Welles & Newton, Heating Contractors
Warren & Wetmore, Architects

ABOVE—
Connecticut General Life Insurance Co., Hartford, Conn.
Baker, Smith & Co., Heating Contractors
James Gamble Rogers, Architects
Jaros & Baum, Construction Engineers

Hospitals, Office Buildings, Hotels, Apartments. For every type of Building, Whitlock Heaters are nationally recognized, and the most careful architects, engineers and contractors recommend and use them.

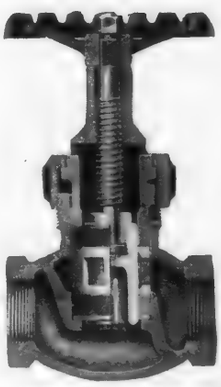
"HOT WATER?—LET WHITLOCK DO IT"

THE WHITLOCK COIL PIPE CO.
40 South St., Hartford, Conn.

New York, Boston, Philadelphia, Chicago, Baltimore, Detroit, Los Angeles, San Francisco, and other principal cities. Consult telephone book.

For pipe lines where ordinary valves will not stand up,

try K PISTON VALVES



Designed for severe service. Easy operation, no leaking seats, no wire-drawing, long life, close regulation, positive shut-off.

Brass, iron and steel for pressures up to 600 lbs.

Bulletin 8-T

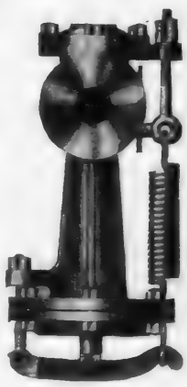
For steam lines where pressures must be reduced,

try K REDUCING VALVES

These valves maintain uniform reduced pressure regardless of fluctuations of initial pressure or flow.

Brass, iron and steel for saturated and superheated steam.

Bulletin 8-R

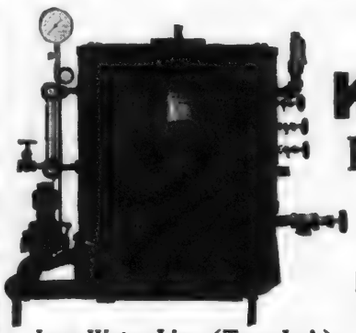


SCHUTTE & KŒRTING Co.
1153 Thompson Street, PHILADELPHIA, PA.

Plenty of Steam

—High or Low Pressure—

for Process Work



Low Water Line (Type L-A)

The PATENTED KANE BOILER

FIRE TUBE AUTOMATIC GAS FIRED

WHEREVER a dependable supply of steam at low cost is required, you will find THE KANE BOILER "on the job," busily producing steam without labor or ashes and with a cleanliness and safety that enable the boiler to be placed right alongside the work.

If you operate a big boiler just for a small amount of steam or if you buy electric power, THE KANE BOILER will oftentimes save enough to pay its own gas bill.

Made in ALL sizes of styles to meet Every Modern Industrial Requirement — Return the Coupon below for Bulletin No. 2

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Manufacturers of

GAS BOILERS AND WATER HEATERS

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Firm .....

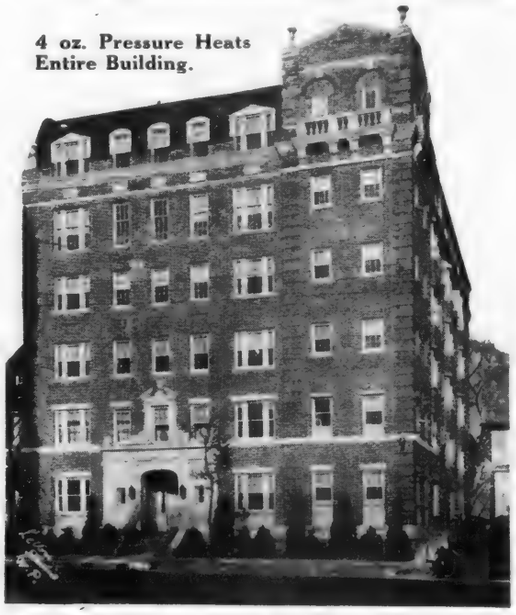
Street .....

City ..... State .....

HV 5-28

Another Apartment heated by **the GORTON SINGLE PIPE VAPOR SYSTEM**

4 oz. Pressure Heats Entire Building.



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Laurence M. Loeb, Architect. Robert Mullins, Heating Contr.
Our New Catalog No. 93 is ready. Send for it.

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You sell satisfaction when you sell

Teeple Controls

ELECTRIC GAS VALVE

Customers expect accuracy and reliability in temperature controls. They are sure of these qualities when you sell them Teeple instruments. They meet every problem of heat control for gas furnaces and boilers; unit heaters; refrigerating plants; ovens; furnaces; and automatic coal and oil burners. You can recommend them.

Write for this new Catalog .....

Our latest Catalog fully illustrates and describes the full line of Teeple Controls. Gladly sent.

L. R. TEEPLE CO.
540 E. 9th St., Portland, Oregon

TEEPLE TEMPERATURE Controls

for GAS — STEAM — WATER — AIR

For All Types of Steam Heating Systems

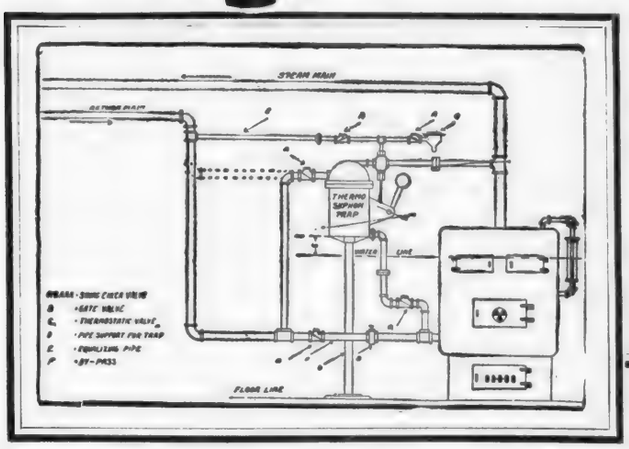
Longer Firing Periods!

One of the outstanding advantages of using oil or gas for heating is the fact that the boiler requires little or no attention—longer firing periods! The reduced number of trips to the cellar is a wonderful convenience, but means an increased danger of low water line if boilers are not properly protected.

With the Thermo Syphon Trap installed, all condensation is returned to the boiler, maintaining the water line, regardless of pressure or vacuum. Your boilers are thus assured protection against burning or cracking.

Better circulation also assured. Operates on any one or two-pipe steam heating system.

Send for Bulletin No. 16-HV giving full details.



Application of Thermo Syphon Trap, showing proper method of piping, for draining any heating system.

For draining vapor, vacuum or any system *without pressure on the returns*, the return line may be run direct to inlet of trap as shown by dotted line.

LYTTON MANUFACTURING CORPORATION

FRANKLIN, VIRGINIA

HIGH GRADE Return, Vacuum, Lifting and Separating Steam Traps, Reducing Valves, Blow-off Valves.

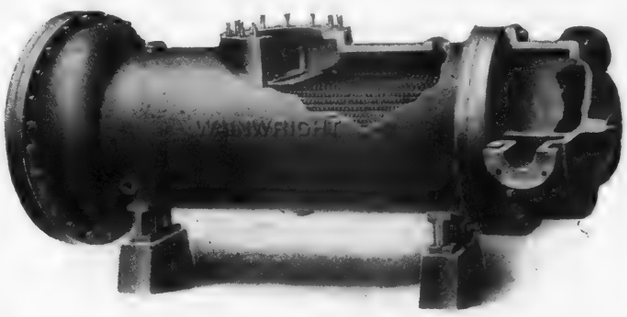
THERMO SYPHON TRAP

Floating Head Feed Water Heaters

The superiority of Foster Wheeler "Wainwright" Feed Water Heaters is based upon the fact that the entire design and manufacture is concentrated in one organization and at one plant. The castings are made in the same iron foundry and of the same excellent grade of iron used in the largest and most expensive condenser shells. They are poured by the same expert foundrymen. Only one quality can be produced in this foundry where the highest is essential for the larger construction.

The tubing—either straight or corrugated—is made complete in the Foster Wheeler tube mill—from electric melting pots to the finished product. Absolute control of quality is thus maintained, rigid testing applied and all reasons for substituting scrap material eliminated.

The design of the heaters is based upon years of experience with all types. Constant research work maintains the engineering practice at the top of the profession.



"Wainwright" Horizontal Floating Head Service and Boiler Feed Water Heater.

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AERO UNIT COAL PULVERIZERS
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EXPANSION JOINTS FEED WATER HEATERS

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FRACTIONATING TOWERS HEAT EXCHANGERS
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TUBE STILLS VACUUM PUMPS
WATER COOLED FURNACE SURFACE
BRASS AND COPPER TUBING AND PIPE

ENGINEERS' SPECIFICATION INDEX

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Nash Engineering Co., So. Norwalk, Conn.
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General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
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Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
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Hoffman Specialty Co., New York.
Marsh & Co., Jas. P., Chicago, Ill.
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Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

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Reed Air Filter Co., Inc., Louisville, Ky.
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Carrier Engineering Corp., Newark, N. J.
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Connor Co., Inc., The W. B., New York.
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(See Fans, Supply & Exhaust).

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Wing Mfg. Co., L. J., New York.

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Johns-Manville Corp., New York.

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Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Moiby Boiler Co., New York.
National Radiator Corp., Johnstown, Pa.
Pacific Steel Boilers Corp., Waukegan, Ill.
Page Boiler Co., Wm. H., New York.
Richmond Radiator Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

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Frost Mfg. Co., Galesburg, Ill.
Leader Iron Works, Decatur, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Richmond Radiator Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

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Brownell Co., The, Dayton, Ohio.
Bryan Steam Corp., Peru, Ind.
Burnham Boiler Co., Irvington, N. Y.
Coatesville Boiler Works, Coatesville, Pa.
Fitzgibbons Boiler Co., Inc., New York.
Freeman Mfg. Co., Racine, Wis.
Frost Mfg. Co., Galesburg, Ill.
Gorton Heating Corporation, New York.
Heggie-Simplex Boiler Co., Joliet, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Moiby Boiler Co., New York.
Monitor Boiler Co., Philadelphia, Pa.
National Radiator Corp., Johnstown, Pa.
Newport Boiler Co., Chicago, Ill.
Orr & Sembower, Inc., Reading, Pa.
Pacific Steel Boilers Corp., Waukegan, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Richmond Radiator Co., New York.
Spencer Heater Co., Williamsport, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Thatcher Co., The, Newark, N. J.
Titusville Iron Works Co., The, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.

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Moiby Boiler Co., New York.
Newport Boiler Co., Chicago, Ill.
Spencer Heater Co., Williamsport, Pa.

BOILERS, OIL-FIRED
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Johnston Brothers, Inc., Ferrysburg, Mich.
Leader Iron Works, Decatur, Ill.

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Titusville Iron Works Co., The, Titusville, Pa.

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Clow & Sons, James B., Chicago, Ill.
Heat Transfer Products, Inc., New York
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

CONDENSERS
Davis Engineering Corp., New York.
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Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
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Spray Engineering Co., Boston, Mass.
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General Air Filters Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

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Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

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Porter, Inc., H. K., Everett, Mass.

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Pecco, Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

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Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
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Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

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Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

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(See Air Cooling & Drying Systems).

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Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa.
Pecco, Inc., St. Louis, Mo.
Reed Air Filter Co., Inc., Louisville, Ky.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

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American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

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American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
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Frost Mfg. Co., Galesburg, Ill.
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Stanwood Corporation, Cincinnati, Ohio.
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McAlear Mfg. Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Swartwout Co., The, Cleveland, Ohio.

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Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

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Illinois Engineering Co., Chicago, Ill.
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Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

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Duriron Company, Inc., The, Dayton, O.

FANS, DISC PRESSURE
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Garden City Fan Co., Chicago, Ill.

FANS, SUPPLY AND EXHAUST
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Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Emerson Electric Mfg. Co., St. Louis, Mo.
Garden City Fan Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
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Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.

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Kieley & Mueller, Inc., New York.
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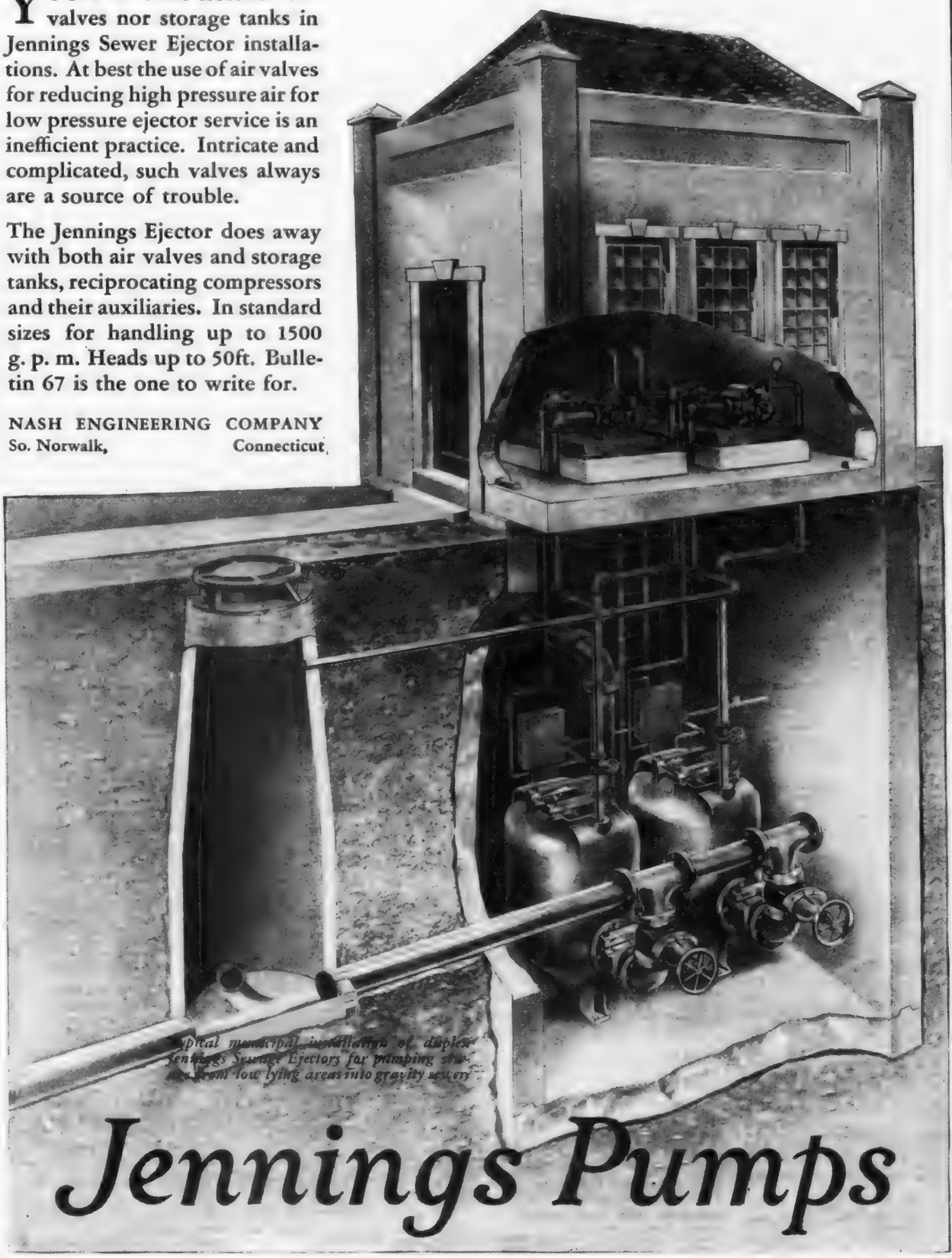
McDonnell & Miller, Chicago, Ill.

No air valve ~ no storage tank

YOU will find neither air valves nor storage tanks in Jennings Sewer Ejector installations. At best the use of air valves for reducing high pressure air for low pressure ejector service is an inefficient practice. Intricate and complicated, such valves always are a source of trouble.

The Jennings Ejector does away with both air valves and storage tanks, reciprocating compressors and their auxiliaries. In standard sizes for handling up to 1500 g. p. m. Heads up to 50ft. Bulletin 67 is the one to write for.

NASH ENGINEERING COMPANY
So. Norwalk, Connecticut



Typical municipal installation of duplex Jennings Sewage Ejectors for pumping sewage from low lying areas into gravity sewer

Jennings Pumps

Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

FILTERS, (AERATING)
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FILTERS, FEED-WATER
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Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Walworth Co., New York

FLANGES
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Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Walworth Co., New York

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Jenkins Bros., New York.
Johns-Manville Corp., New York.

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Jenkins Bros., New York.

GASKETS, RUBBER
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American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Clow & Sons, James B., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGE GLASSES
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.

GAUGES, ALTITUDE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
United States Radiator Corp., Detroit, Mich.

GAUGES, DRAFT
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGES, HYDRAULIC
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

GAUGES, OUNCE GRADUATED
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

GAUGES, PRESSURE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

GAUGES, VACUUM
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

GAUGES, VACUUM (COMPOUND)
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

GAUGES, WATER
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

GENERATOR COOLING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Reed Air Filter Co., Inc., Louisville, Ky.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

GOVERNORS, (PUMP)
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Webster & Co., Warren, Camden, N. J.

GRATES, DUMPING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio
Titusville Iron Works Co., The, Titusville, Pa

GRATES, ROCKING
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

GRATES, SHAKING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING AND DUMPING
Frost Mfg. Co., Galesburg, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING, CIRCULAR
Fitzgibbons Boiler Co., Inc., New York.
Pyramid Iron Products Corp., New York.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, STATIONARY
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRILLES
Metalace Corporation, Boston, Mass.

HEAT CABINETS
Clow & Sons, James B., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Metal Stamping Co., Long Island City.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

HEATERS, AIR, FAN SYSTEM
Aerofin Corp., Newark, N. J.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

HEATERS, DOMESTIC WATER
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Blake Specialty Co., Rock Island, Ill.
Davis Engineering Corp., New York.
Excelso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Molby Boiler Co., New York.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., The, Erie, Pa.
Taco Heaters, Inc., New York.
Thatcher Co., The, Newark, N. J.
Titusville Iron Works Co., The, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, ELECTRICAL UNIT
American Blower Co., Detroit, Mich.

HEATERS, FEED WATER, (CLOSED)
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, Carteret, N. J.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Malleable Iron Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, FEED WATER, (OPEN)
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Webster & Co., Warren, Camden, N. J.

HEATERS, FUEL-OIL
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Electrol, Inc., St. Louis, Mo.
Excelso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Air Filter Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Taco Heaters, Inc., New York.
Titusville Iron Works Co., The, Titusville, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, UNIT
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

HEATING SYSTEMS, GAS
Clow & Sons, James B., Chicago, Ill.

HEATING SYSTEMS, VACUUM
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Spencer Heater Co., Williamsport, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, VAPOR
American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, WATER
American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Grinnell Co., Providence, R. I.
Hornung, J. C., Chicago, Ill.
Mueller Co., Decatur, Ill.
Page Boiler Co., Wm. H., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Spencer Heater Co., Williamsport, Pa.
Thatcher Co., The, Newark, N. J.
Thrush & Co., B. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
York Heating & Ventilating Corp., Phila., Pa.

HUMIDITY CONTROL
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.

INSTRUMENTS, ELECTRIC MEASURING
Bristol Co., The, Waterbury, Conn.

INSTRUMENTS, INDICATING AND RECORDING
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
American Temperature Indicating Co., Toledo, Ohio.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

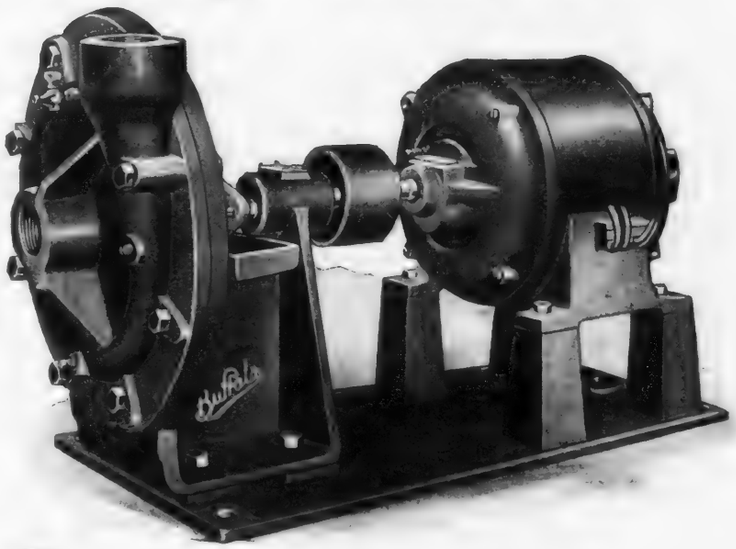
INSULATION, BOILER, PIPE, ETC.
(See Covering, Boiler, Pipe, etc.)

INSULATION, BUILDING
Banner Rock Products Co., Alexandria, Ind.
Flax-li-num Insulating Co., St. Paul, Minn.
Insulite Co., Minneapolis, Minn.
Johns-Manville Corp., New York.

MANOMETERS
American Blower Co., Detroit, Mich.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.

A New Pump Value

The Buffalo Class CH Pump offers a new interpretation of efficient, reliable performance at low cost. It has been carefully checked under the most severe conditions and definite performance curves and rating tables recorded. Efficiencies are far higher than those now accepted as standard for this type of pump, and are often high enough to permit using a size smaller motor.



Buffalo Steam Pump Co.

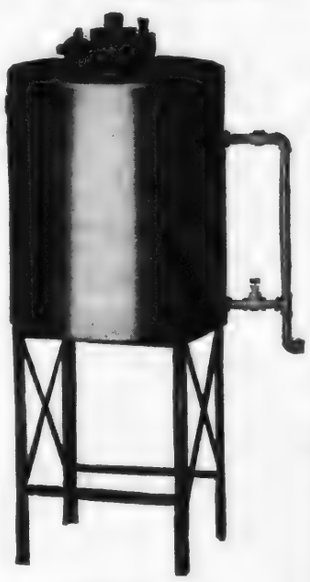
480 Broadway Buffalo, N. Y.

In Canada—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Note that the discharge is adjustable to eight different positions to adapt to the conditions of the installation.

Quiet, Smooth-Running, Enduring

Monroe Oil Pumps Cut Dealers' Service Costs



Type TJF

Consists of the sturdy TJU pumping unit built into a 50-gallon tank. Designed especially for the natural draft or combination natural-and-forced draft burner. Always carries a 35-gallon reserve. Tank is finished in attractive green shade; motor in black enamel.

Exclusive Monroe Features

1. Janette Motor
2. Steel Pistons
3. Carbon Contact Switch
4. Extra-large Brass Float
5. Compound leverage on switch

Type TJU

Universally popular among home-owners with single-burner installations. Capacity, 15 gallons per hour. May be mounted either on floor or wall. Low cost. Finished in black enamel.

MONROE Oil Pumps are unsurpassed for quiet operation. Every moving part is machined to such accuracy and so perfectly coordinated that troublesome, noise-producting vibration is practically eliminated.

Wear, also, is practically done away with, due to the close tolerances in which the moving parts of a Monroe Oil Pump work.

In addition to fine workmanship, Monroe Oil Pumps are also made of the best possible materials, assuring unfailing operation. Hundreds of shrewd dealers are making certain of their customers' satisfaction—and cutting service costs—by standardizing on Monroe Oil Pumps.

Mail Coupon TODAY!

Janette Manufacturing Company

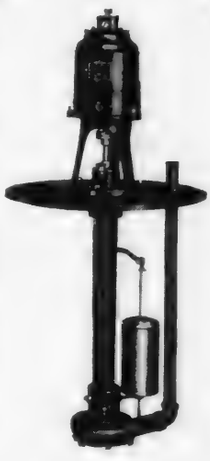
556-58 West Monroe Street,

CHICAGO.

Singer Bldg., 149 Broadway, New York.

Real Estate Trust Bldg., Philadelphia.

Harrison Sales Co., Seattle, Portland, Spokane.



Monroe Sump Pump

Combines in one pump all the latest features of sump pump design and construction. Unfailing operation and long life have been built into the Monroe Sump Pump. Attractively finished in baked-on black enamel.

Janette Manufacturing Co. HV5
556-58 W. Monroe St., Chicago.

Gentlemen: Please send me full information on Monroe Oil Pumps ☐ Sump Pumps ☐ Oil Strainers ☐

Name .....

Company .....

Address .....

City ..... State .....

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Garden City Fan Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
New York Blower Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

METALS, THERMOSTATIC
Chace Valve Co., W. M., Detroit, Mich.

METERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.

METERS, FEED WATER
Central Station Steam Co., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

METERS, FLOW
Foxboro Co., Inc., The, Foxboro, Mass.
Spray Engineering Co., Boston, Mass.

METERS, PITOT TUBE
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.

METERS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Builders Iron Foundry, Providence, R. I.

MOTORS (ELECTRIC)
Baldor Electric Co., St. Louis, Mo.
Century Electric Co., St. Louis, Mo.
Emerson Electric Mfg. Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Lincoln Electric Co., Cleveland, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

NOZZLES, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

NOZZLES, SPRAY
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

OIL BURNERS
American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Cleveland Steel Products Corp., Cleveland, Ohio
Eisler Engineering Co., Newark, N. J.
Electrol, Inc., St. Louis, Mo.
Gulf Oil Burner Co., Philadelphia, Pa.
Hardinge Bros., Inc., Chicago, Ill.
Laco Gas Burner Co., Griswold, Iowa.
McIlvaine Burner Corporation, Chicago, Ill.
Nu-Way Corporation, Rock Island, Ill.
Pascoe Company, The Wm. H., Chicago, Ill.
Petroleum Heat & Power Co., New York.
Security Stove & Mfg. Co., Kansas City, Mo.
York Oil Burner Co., York, Pa.

OIL BURNER EQUIPMENT
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Cook Electric Co., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Preferred Utilities Mfg. Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster Electric Co., Racine, Wis.

OIL BURNER IGNITION AND CONTROL EQUIPMENT
Absolute Con-Tac-Tor Corp., Elkhart, Ind.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Webster Electric Co., Racine, Wis.

PIPE, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

PIPE, CAST IRON
Clow & Sons, James B., Chicago, Ill.

PIPE, STEEL
Clow & Sons, James B., Chicago, Ill.
National Tube Co., Pittsburgh, Pa.

PIPE, WOOD
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE BENDING
Badger & Sons Co., E. B., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (WOOD)
American District Steam Co., North Tonawanda, N. Y.
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE HANGERS
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Walworth Co., New York

PIPE THREADING & CUTTING MACHINES
National Pipe Bending Co., New Haven, Conn.

PRESSURE REDUCING VALVES
(See Regulators, Pressure).

PULLEYS, VARIABLE SPEED
Horton Mfg. Co., Minneapolis, Minn.

PUMPS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

PUMPS, CENTRIFUGAL
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, Carteret, N. J.
Nash Engineering Co., So. Norwalk, Conn.
Trane Co., The, LaCrosse, Wis.

PUMPS, CENTRIFUGAL, VACUUM HEATING
Ames Pump Co., New York.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

PUMPS, CONDENSATION
American Steam Pump Co., Battle Creek, Mich.
Ames Pump Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

PUMPS, OIL
Connor Co., Inc., The W. B., New York.
Janette Mfg. Co., Chicago, Ill.

PUMPS, RECIPROCATING STEAM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.

PUMPS, SUMP
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, TURBINE
Chicago Pump Co., Chicago, Ill.
Foster Wheeler Corporation, Carteret, N. J.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, VACUUM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

RADIATOR ENCLOSURES OR SHIELDS
American Metal Products Corp., St. Louis, Mo.

RADIATOR HANGERS
American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., St. Paul, Minn.
Kewanee Boiler Corp., Kewanee, Ill.
McAlear Mfg. Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.

RADIATORS, BRASS
Rome Brass Radiator Corp., New York.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.

RADIATORS, GAS HEATED
Clow & Sons, James B., Chicago, Ill.

RADIATORS, STEAM & WATER
American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Moiby Boiler Co., New York.
National Radiator Corp., Johnstown, Pa.
Nelson Corp., Herman, The, Moline, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Richmond Radiator Co., New York.
Thatcher Co., The, Newark, N. J.
United States Radiator Corp., Detroit, Mich.

RECEIVERS, AIR
Brownell Co., The, Dayton, Ohio.
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

RECEIVERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

REGULATORS, BOILER-FEED
Atlas Valve Co., Newark, N. J.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

REGULATORS, DAMPER
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Atlas Valve Co., Newark, N. J.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Regulator Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

REGULATORS, PRESSURE
American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Teeple Co., L. R., Portland, Oregon

REGULATORS, TEMPERATURE
(See Temperature Control).

SEPARATORS, OIL
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster & Co., Warren, Camden, N. J.

SEPARATORS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Swartwout Co., The, Cleveland, Ohio.
Webster & Co., Warren, Camden, N. J.

SPRAY COOLING SYSTEMS
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Seymour, James M., Newark, N. J.

SPRAY NOZZLES
(See Nozzles, Spray).

STRAINERS, OIL
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

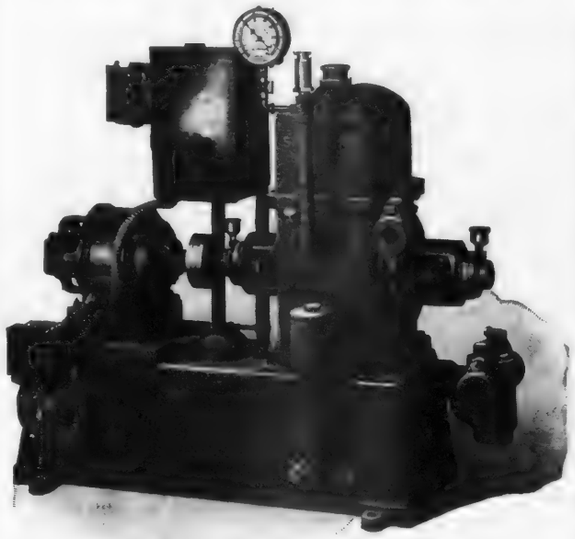
STRAINERS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

STRAINERS, WATER
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

TEMPERATURE CONTROL
Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mercoid Corporation, Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Raymond, F. I., River Forest, Ill.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Teeple Co., L. R., Portland, Oregon
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

THERMOMETERS, RECORDING & INDICATING
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
American Temperature Indicating Co., Toledo, Ohio.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
National Radiator Corp., Johnstown, Pa
Pierce, Butler & Pierce Mfg. Corp., New York.

SKIDMORE



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high or low water line in the system when operating on float control?

The Skidmore pump on interceptor base is designed to give low water line operation without pitting.

The unit is self contained, ball bearing, and operated by one motor. It produces vacuum on the system even when operating on float control, a desirable feature.

The unit consists of two pumps in one housing on one shaft, an air pump and a centrifugal pump for boiler feed. Motor and pump are mounted directly on interceptor base. This construction means compactness in design and minimum floor space occupied.

The automatic starter together with vacuum regulator and float switch are mounted on this unit. All wiring is installed at the factory.

Bulletin No. 5 illustrating this unit is now available.

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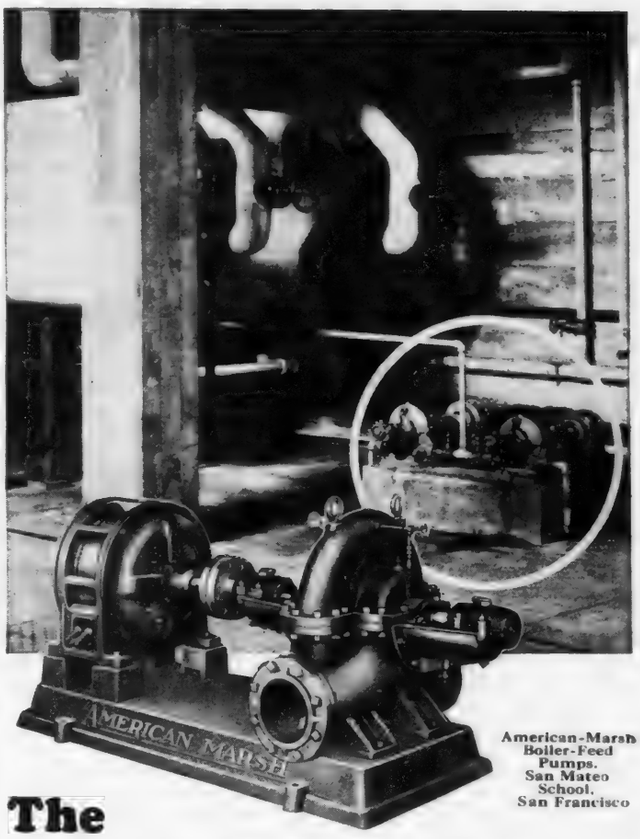

American-Marsh Boiler-Feed Pumps. San Mateo School, San Francisco

The Heart of Your System Must be Dependable

THERE can be no substitute for quality when it comes to the boiler-feed pump. It is the very heart of your heating system. If the pump stops, heat stops.

We build our centrifugal boiler-feed pumps heavier than customary—heavier by quite a margin. This extra weight in every working part means extra strength—greater ability to endure the strains and stresses of continuous service, year after year.

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Condensation
Circulating
Booster
Fire
Sewage Handling

AMERICAN-MARSH

AMERICAN STEAM PUMP COMPANY
BATTLE CREEK, MICHIGAN, U. S. A.

Pumping Equipment

Powers Regulator Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.

THERMOSTATS

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Johnson Service Co., Milwaukee, Wis.
Mercoid Corporation, Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

TRAPS, BUCKET

Swartwout Co., The, Cleveland, Ohio.

TRAPS, FLOAT

Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Sarco Co., Inc., New York.
Swartwout Co., The, Cleveland, Ohio

TRAPS, INVERTED BUCKET (STEAM AND AIR)

Armstrong Machine Works, Three Rivers, Mich.

TRAPS, LIFTING

Lytton Mfg. Corp., Franklin, Va.
Swartwout Co., The, Cleveland, Ohio.

TRAPS, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
Armstrong Machine Works, Three Rivers, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville Corp., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

TRAPS, RETURN

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Swartwout Co., The, Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TRAPS, STEAM

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Davis Engineering Corp., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.

TRAPS, VACUUM

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Swartwout Co., The, Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TUBING, COPPER AND BRASS

Wolverine Tube Co., Detroit, Mich.

TURBINES, STEAM

Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

TURBO-BLOWERS

Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Garden City Fan Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

UNDERGROUND PIPE CONDUITS

American District Steam Co., North Tonawanda, N. Y.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

VACUUM CLEANING APPARATUS

American Radiator Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VALVES, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

VALVES, AIR, AUTOMATIC

American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A., New York.
United States Radiator Corp., Detroit, Mich.

VALVES, AIR RELIEF

American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Gorton Heating Corporation, New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.

VALVES, BACK PRESSURE

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, BALANCED

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, BLOW-OFF

Jenkins Bros., New York.
Lytton Mfg. Corp., Franklin, Va.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

VALVES, CHECK

Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Milwaukee Valve Co., Milwaukee, Wis.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

VALVES, FLOAT

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, GATE

American District Steam Co., North Tonawanda, N. Y.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

VALVES, GLOBE, ANGLE & CROSS

Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Phila., Pa.
Walworth Co., New York.

VALVES, HYDRAULIC-OPERATING

Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Walworth Co., New York

VALVES, MAGNETIC

Absolute Con-Tac-Tor Corp., Elkhart, Ind.

VALVES, NON-RETURN

Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Capitol Brass Works, Detroit, Mich.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vapor Engineering Co., New York.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

VALVES, REDUCING

(See Regulators, Pressure).

VALVES, REGULATING

Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Walworth Co., New York

VALVES, RELIEF (WATER)

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Kainer & Company, Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Radiator Corp., Johnstown, Pa.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

VALVES, SAFETY

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
National Radiator Corp., Johnstown, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
United States Radiator Corp., Detroit, Mich.
Walworth Co., New York

VALVES, STOP AND CHECK

(See Valves, Non-Return).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
American Radiator Co., Buffalo, N. Y.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Lakeside Company, The, Hermansville, Mich.
Nelson Corp., Herman, The, Moline, Ill.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Co., New York.

VENTILATING SYSTEMS, ACID

Duriron Company, Inc., The, Dayton, O.

VENTILATORS

Bayley Blower Co., Milwaukee, Wis.
DeBothezat Impeller Co., Inc., New York
Midwest Air Filters, Inc., Bradford, Pa.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VENTILATORS, MUSHROOM

Aeolus Dickinson Co., Chicago, Ill.
American Blower Co., Detroit, Mich.
American Metal Products Corp., St Louis, Mo.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowles Mushroom Ventilator Co., New York.
Ventilating Products Co., Chicago, Ill

VENTILATORS, ROOF

Aeolus Dickinson Co., Chicago, Ill.

VENTILATORS, UNIT

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
DeBothezat Impeller Co., Inc., New York
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

WATER STERILIZERS

Clow & Sons, James B., Chicago, Ill

WEATHER STRIPS, METAL

Athey Co., Chicago, Ill.

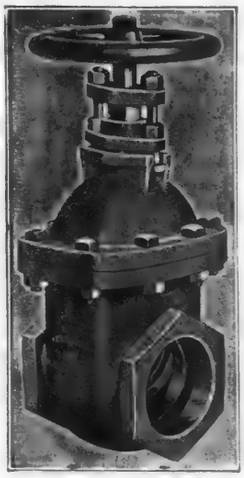
WELDERS, ELECTRIC ARC

Lincoln Electric Co., Cleveland, Ohio.

WRENCHES, STILLSON

Walworth Co., New York.

IRON BODY GATE VALVES



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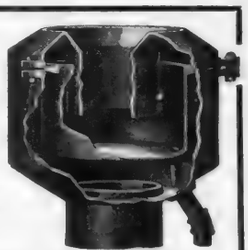
ALL-CAST-IRON
EXHAUST HEAD



Oil and water content of the exhaust steam escaping and falling upon the roof brings about a condition of decay and disintegration.

Dickinson Exhaust Heads prevent this condition, and being made of cast iron, will last as long as the building. This overcomes necessity of constant replacements.

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3336-44 So. Artesian Ave. CHICAGO
(Some territory open for agents)

WEIL PUMPS
For Better Service

Weil "Tujur Return" Condensation Pump and Receiver. Capacities 2,000 to 150,000 sq. ft. direct radiation.

Write for Bulletin T.R. 100.

A few agencies still open.

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BILGE · SEWAGE FIRE · HOUSE CIRCULATING
BOILER FEED. CONDENSATION VACUUM
Manufacturers of Better Centrifugal Pumps
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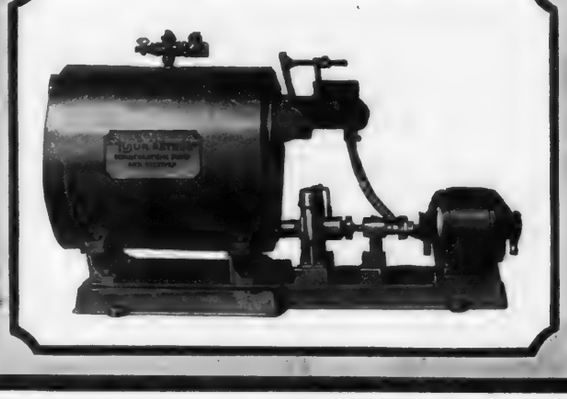
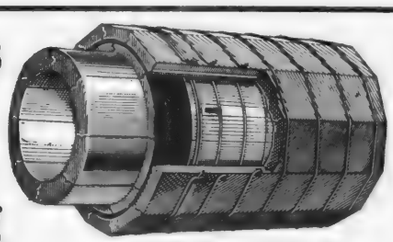


Wyckoff's
Improved
Cypress
Covering



Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.

ALPHABETICAL INDEX OF ADVERTISEMENTS

A

Absolute Con-Tac-Tor Corp. 46
Aeolus Dickinson 185
Aerofin Corporation 60
Alberger Heater Co. 168
Alexander Bros., Inc. 126
American Blower Co. 139
American District Steam Co. 28
American Gas Products Corp. ... —
American Metal Products Corp. . 140
American Nokol Co. 162
American Radiator Co. 36, 45
American Schaeffer & Budenberg Corp. 171
American Steam Pump Co. 183
American Temperature Indicating Co. 154
Ames Pump Co. 121
Armstrong Machine Works 51
Athey Co. 58
Atlas Valve Co. 148
Automatic Burner Corp. 34
Autovent Fan & Blower Co. 125

B

Badger & Sons Co., E. B. 26
Baldor Electric Co. 146
Banner Rock Products Co. 24
Barnes & Jones 44
Bayley Blower Co. 149
Bishop & Babcock Sales Co. 57
Blake Specialty Co. 150
Bristol Co. 150
Brownell Co. 162
Bryan Steam Corp. 165
Buffalo Forge Co. 133
Buffalo Steam Pump Co. 181
Builders Iron Foundry 30
Burnham Boiler Corp. 13

C

Capitol Brass Works 40
Carrier Air Conditioning Co. of America 133
Carrier Engineering Corp. 148
Cashin Co., W. D. 154
Central Station Steam Co. 152
Century Electric Co. 56
Chace Valve Co., W. M. 148
Chicago Pump Co. ..... —
Cissell Mfg. Co., W. M. 158
Clarage Fan Co. 2
Cleveland Gas Burner & Appliance Co. 27
Cleveland Steel Products Corp. .. 160
Clow & Sons, James B. 167
Coatesville Boiler Works 15
Cook Electric Co. 142

D

Davis Engineering Corp. 174
Davis Regulator Co., G. M. 174
DeBothezat Impeller Co. 132
Dunham Co., C. A. 55
Duriron Co., Inc. 144
Dwyer Equipment Co. 47

E

Economy Pumping Machinery Co. 123
Eisler Engineering Co. 163
Electrol, Inc. 37
Emerson Electric Mfg. Co. 138
Excelso Products Corp. 12

F

Fitzgibbons Boiler Co. 160
Flax-li-num Insulating Co. 136
Foster Wheeler Corp. 177
Foxboro Co., Inc. 165
Frank Heater & Engineering Co., Inc., O. E. 172
Freeman Mfg. Co. 163
Frost Mfg. Co. 11
Fulton Sylphon Co. 131

G

Garden City Fan Co. 138
General Air Filters Corp. 140
Gorton Heating Corp. 176
Gradon Mfg. Co. 152
Grinnell Co., Inc. 127
Gulf Oil Burner Co. 164

H

Haines & Co., Wm. S. 186
Hardinge Brothers, Inc. 33
Hartmann Co., Chas. 146
Healy-Ruff Co. 130
Heating and Piping Contractors National Ass'n 159
Heat Transfer Products, Inc. ... 22
Heggie-Simplex Boiler Co. 62
Hoffman Specialty Co. 188
Hornung, J. C. 162
Horton Mfg. Co. 140

I

Illinois Engineering Co. 59
Illinois Malleable Iron Co. 185
Insulite Co. 135
International Fuel Service Corp. .168

J

Janette Mfg. Co. 29, 181
Jenkins Bros. 174
Johns-Manville Corp. ..... —
Johnson Service Co. 64
Johnston Brothers, Inc. 158

K

Kainer & Company 20
Kewanee Boiler Corp. 3
Kieley & Mueller, Inc. 41
Knowles Mushroom Ventilator Co. 128

L

Laco Gas Burner Co. 160
Lakeside Co. 151
Leader Iron Works 172
Lincoln Electric Co. 54
Lytton Mfg. Co. 177

M

Marsh & Co., Jas. P. 170
Marsh Valve Co. 50
Mason Regulator Co. 169
McAlear Mfg. Co. 25
McDonnell & Miller 173
McIlvaine Burner Corp. 164
McQuay Radiator Corp. 150
Mears-Kane-Ofeldt, Inc. 176
Mercoid Corp., The 49
Metal Stamping Co. 148
Midwest Air Filters, Inc. ..... —
Milwaukee Valve Co. 61
Modine Mfg. Co. 147
Molby Boiler Co. 166
Monitor Boiler Co. 21
Mueller Co. 52, 53

N

Nash Engineering Co. 124, 179
National Air Filter Co. 153
National Pipe Bending Co. 173
National Radiator Corp. 16
National Regulator Co. 168
National Tube Co. 10
Nelson Corp., Herman 137
Newport Boiler Co. ..... —
New York Blower Co. ...Front Cover
Nu-Way Corp. 35

O

Orr & Sembower, Inc. 8

P

Pacific Steel Boilers Corp. 4
Page Boiler Co., Wm. H. 5
Pascoe Co., Wm. H. 166
Patterson-Kelley Co. 172
Peerless Unit Ventilation Co. 134
Petroleum Heat & Power Co. .... —
Phillips Drill Co. 166
Pierce, Butler & Pierce Mfg. Corp. ..... —
Porter, Inc., H. K. 157
Powers Regulator Co. 119
Preferred Utilities Mfg. Corp. ... 156
Pyramid Iron Products Co. 166

R

Raymond, F. I. 160
Reed Air Filter Co., Inc. 155
Richmond Radiator Co. 19
Ric-wiL Co. 31
Rome Bass Radiator Corp. 18
Rome-Turney Radiator Co. 144
Ross Heater & Mfg. Co. 172
Russell & Co., W. A. ..... —

S

Sarco Co. 169
Schutte & Koerting Co. 175
Security Stove & Mfg. Co. 154
Seymour, James M. 140
Shaw-Perkins Mfg. Co. 152
Simplex Heating Specialty Co. .. 130
Sims Co. 170
Skidmore Corp. 183
Skinner Bros. Mfg. Co. 141
Spencer Heater Co. 6
Spray Engineering Co. 146
Stanwood Corp. 9
Stay-Rite Co., Inc. 158
Sterling Engineering Co. 171
Sturtevant Co., B. F. 129, 145
Swartwout Co. 167

T

Taco Heaters, Inc. 14
Teeple Co., L. R. 176
Thatcher Co. 17
Thermal Units Co. .....Insert 34A
Thrush & Co., H. A. 39
Titusville Iron Works Co. 7
Trane Co. 42
Typhoon Fan Co. 138

V

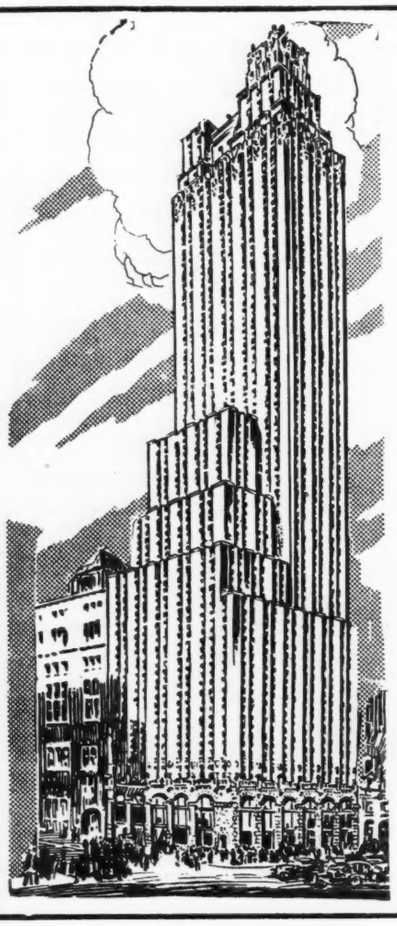
Vapor Engineering Co. ..... —
Ventilating Products Co. 142

W

Walworth Co. 23
Want Ads 132
Webster & Co., Warren 48
Webster Electric Co. 32
Weil-McLain Co. 187
Weil Pump Co. 185
Western Engineering Co. 152
Whitlock Coil Pipe Co. 175
Wing Mfg. Co., L. J. 143
Wolverine Tube Co. 43
Wyckoff & Son Co., A. 185

Y

York Heating and Ventilating Corp. 142
York Oil Burner Co. 38



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Architects & Engineers

RAISLER HEATING CO.
Heating Contractors

Haines Traps function year after year without need of attention or repair.

WILLIAM S. HAINES & CO.

12th and Buttonwood Streets PHILADELPHIA

Fable of the Child *and the* Reflection

A little girl, carrying a lump of sugar while wading in a stream, saw her image reflected in the water below. Desiring the other little girl's sugar, too, she grabbed for the supposed treasure, but in so doing, her own sugar melted away and she lost all.

Aesop's Fables (revised)

In the same way, a heating contractor may risk his business capital in seeking some advantage, which he thinks he sees in the river of price competition.

Thoughtlessly he reaches out for more work by featuring a low price. Of course, his price argument may get a few jobs—but in the end he loses. He loses both profits and prestige.

Alert heating contractors ask a profit and submit along with their bids, distinctive quality features such as Weil-McLain corrugated heating surfaces, long back-and-forth fire travel and scientific combustion. They are adhering to policies that give better promise of business success.

WEIL-McLAIN COMPANY

Manufacturing Division
Michigan City, Indiana

Executive Offices
Chicago, Illinois

Fight fuel waste with

Weil-McLain

SCIENTIFIC COMBUSTION

BOILERS

in 1928

"SEE THE WEIL-McLAIN JOBBER IN YOUR TERRITORY"

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"The MOST INTERESTING EVENING I EVER SPENT"

So said many heating men who attended early showings of the

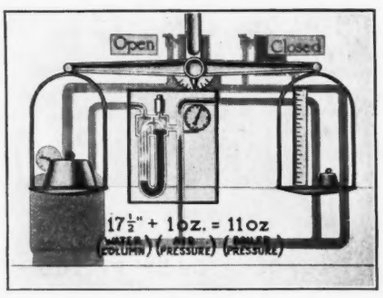
NEW HOFFMAN MOTION PICTURE

The Watchman of the Coal Pile

IN A number of cities, the new Hoffman film, "Controlled Heat" has already been shown to groups of heating men. Thousands have viewed it.

So unusual is this photoplay, so accurately does it mirror comic and serious incidents familiar to heating men, so clearly does it explain each detail of the modern vapor vacuum heating system, that many men who have seen it say, "It was the most interesting evening I ever spent."

Three reels of drama, comedy and absorbing, useful information . . . The amusing heating difficulties of the ancient caveman . . . The old-fashioned central heating systems that went with the architecture of the 90's . . . The modern scene, with the confusions of selecting from the many types of efficient present day heating systems . . . And then, clearly picturized, the operation of Hoffman Controlled Heat.



As private showings of this amazing film are scheduled, invitations will be mailed. Be sure to see this motion picture. If you want to know the date of the showing near you, mail a post card for particulars.

HOFFMAN SPECIALTY COMPANY, *Inc.*

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Makers of the famous "Watchman-of-the-Coal Pile" Air Valves